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1999

EPA Superfund
Record of Decision:

PATUXENT RIVER NAVAL AIR STATION
EPA ID: MD7170024536
OU 08
PATUXENT RIVER, MD
12/16/1998

Record Of Decision

for

Operable Unit 1, Soils

Pesticide Shop (Site 17)

Naval Air Station Patuxent River

Patuxent River, Maryland

Engineering Field Activity Chesapeake

Naval Facilities Engineering Command

December 1998

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

FIGURES

ACRONYMS

ARARS	Applicable Or Relevant and Appropriate Requirements
B&R	Brown & Root (Environmental)
BAF	Bioaccumulation Factor
BTAG	Biological Technical Advisory Group
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
COPCs	Contaminants of Potential Concern
CKD	Cement Kiln Dust
CPF	Cancer Potency Factor
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
FFS	Focused Feasibility Study
FI	Fractional Intake
FR	Federal Register
HI	Hazard Index
HNUS	Halliburton NUS
ICR	Incremental Cancer Risk
IR	Installation Restoration
IRI	Interim Remedial Investigation
LDR	Land Disposal Restriction
LOAEL	Lowest Observed Adverse Effects Level
MCL	Maximum Contaminant Level
MDE	Maryland Department of the Environment
NAS	Naval Air Station
NCP	National Contingency Plan
NOAEL	No Observed Adverse Effects Level
PRAP	Proposed Remedial Action Plan
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dosage
ROD	Record of Decision

SVOCs	Semi-Volatile Organic Compounds
TCL	Toxic Compounds List
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	Treatment/Storage/Disposal Facility
VOCs	Volatile Organic Compounds

1.0 DECLARATION FOR THE RECORD OF DECISION

1.1 SITE NAME AND LOCATION

Site 17-Pesticide Shop is located at Naval Air Station (NAS) Patuxent River, Maryland. This Record of Decision (ROD) addresses the contaminated soil at this site.

1.2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the following final remedy for Operable Unit 1 (OU 1) soil at Site 17:

- Excavation of soil that poses an unacceptable risk to human health (soil with contaminant concentrations that exceed human health and groundwater protection remediation criteria (RC)). Excavated soil will be treated off-site treatment by incineration and disposed of at a Resource Conservation Recovery Act (RCRA) Subtitle C facility.

- Conduct site-specific soil toxicity and bioaccumulation tests during the remedial design and remedial action (RD/RA) on the contaminated soil. The data from the site-specific soil toxicity tests will be used to complete the ecological risk assessment to determine if there is an unacceptable risk to ecological receptors.

- If there is an unacceptable risk to ecological receptors, the Navy shall place a vegetated soil and gravel cover over the contaminated soil that poses an unacceptable risk to ecological receptors. The vegetated soil and gravel cover will protect ecological receptors by eliminating the pathway of exposure to the receptors.

- Institutional controls to limit the use of the property so that integrity of the gravel and soil cover will not be compromised. The need for institutional controls to protect human exposure will be evaluated following completion of confirmatory sampling.

The selected remedial action was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and

Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record for Site 7 which was developed in accordance with Section 113(k) of CERCLA, and is available for public review. By excavation and removal of the contaminated soil in excess of human health and groundwater protection levels, the U.S. Navy plans to remedy the primary potential threats to human health: direct exposure to contaminated soil and migration of contamination into the groundwater. If required by site-specific ecological toxicity tests, the use of a soil cover with a layer of gravel over the entire site is proposed by the U.S. Navy to protect potential ecological receptors from the threat of exposure to the residual contaminants in the soil. The State of Maryland acting through the Maryland Department of Environment (MDE) concurs with the selected remedy for Site 17.

1.3 ASSESSMENT OF SITE 17-PESTICIDE SHOP

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

1.4 DESCRIPTION OF THE SELECTED REMEDY

This remedial action addresses the soil (Operable Unit 1) at Site 17. The groundwater and sediment in 0 Pond 3 will be addressed as a separate operable unit.

The U.S. Navy has determined that excavation and offsite incineration of the approximately 1,300 cubic yards of soil contaminated that exceed human health and groundwater protection levels, is appropriate for the contaminated soil at this site. Potential exposure to the soil and migration of the contaminants are the principal threats posed by the site. This remedy involves excavation of the soil followed by off-site incineration and landfilling of the ashes. The remaining contaminated soil over the area of approximately 51,000 square feet will be regraded and covered with a 2 feet barrier (consisting of soil and gravel) and vegetation. The necessity of the soil/gravel barrier over the remaining contaminated area and the extent of the barrier will be verified based on ecological protection criteria, which will be determined by site-specific toxicity tests conducted during the remedial design and remedial action (RD/DA). The remedy will also include demolition of aboveground buildings and structures and excavation of underground structures such as a dry well and holding tank At the time of excavation of underground structures, soil contaminated at levels that exceed groundwater protection levels established in the record of decision (ROD) will also be excavated and incinerated off site.

1.5 STATUTORY DETERMINATIONS

The remedy selected by both the EPA and U.S. Navy with State of Maryland concurrence for Site 17 is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate requirements to this remedial action, and is cost-effective. Because this remedy will result in contaminants remaining in soil on site above unlimited residential use and ecological screening levels, the 5-year review process will apply to this action. This remedy uses permanent solutions and alternative treatment technologies to the maximum extent practicable for this site. The selected remedy satisfies the statutory preference for remedies that employ treatment as a principal element to reduce toxicity, mobility, or volume of contaminants.

1.6 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF REMEDY

This ROD represents the selection of a remedial action under CERCLA for Site 17 OU1. The foregoing represents the selection of a remedial action by the Department of the Navy and the United States Environmental Protection Agency Region III with the concurrence of the Maryland Department of Environment.

Department of the Navy

By: Paul E Roberts Date: 8 Dec 98

Concur and recommend for immediate implementation:

Captain Paul Roberts
Commanding Officer
Naval Air Station
Patuxent River, Maryland

United States Environmental Protection Agency

By: Abraham Ferdas Date: Dec 16, 1998

Abraham Ferdas, Director
Hazardous Site Cleanup Division (3HS00)
U.S. Environmental Protection Agency, Region III
Philadelphia, Pennsylvania

2.0 DECISION SUMMARY

2.1 SITE NAME, LOCATION, AND DESCRIPTION

This Record of Decision (ROD) is issued to describe the U.S. Navy's selected remedial action for Operable Unit 1 (OU1), Soil at Site 17-Pesticide Shop, at the Naval Air Station (NAS), Patuxent River, Maryland (Figure 2-1). The Pesticide Shop is one of several Installation Restoration (IR) sites located at the NAS. Site 17 - Pesticide Shop is located in the central part of the NAS, at the intersection of Tate Road and Payne Road (Figure 2-2).

Site 17 consists of the land surrounding Building 841 and nearby storage sheds that are surrounded by a fence (Figure 2-3). As shown on Figure 2-2, the sediments in the stream south of Tate Road and sediments in Pond 3 (located approximately 1000 feet south/southwest of the pesticide shop location) are downgradient of Site 17, but are not considered a part of OU1 at this site for the purpose of this remedial action. Open fields are located to the north and east of the site, while wooded areas are located east and south (across Payne Road) of the site. Site 17 is next to Pond 4 and up gradient of Pond 3. The Navy in conjunction with the State of Maryland has imposed a restriction on consumption of fish from the ponds. Access to Site 17 is restricted. A security fence surrounds the site thus restricting access. The area immediately west of the site (Pond 4 Area) is used for recreational purposes. Areas immediately north, east and south of the site are undeveloped. Groundwater flows toward Pond 3, the Patuxent River and the Chesapeake Bay. Base residential housing is located within a quarter (1/4) mile of the site on Payne Road. The community of Lexington Park is about 3/4 of a mile west of the site and next to the installation boundary.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.2.1 <u>History of Site Activities</u>

Pest and weed control operations at the NAS were based at Building 841 from 1962 to 1989. Pesticides used in the pest control operations have included chlorinated hydrocarbons, carbamates, hormones, fungicides, and wood preservatives. Herbicides were also used. Some specific pesticides/herbicides used at the NAS included 4,4'-DDT, sevin, malathion, aldrin, diazinon, naled, lead arsenate, dieldrin, chlordane, pentachlorophenol (PCP), methoxychlor, entex, sodium arsenate, 2,4-D, and kepone. Although pest control practices prior to 1962 cannot be documented, aerial spraying with 4,4'-DDT for control of mosquitoes was reportedly carried out until the late 1950s (Fred C. Hart, March 1984). Aerial spraying for control of Japanese beetles was done more recently (1969-1971) (HNUS, April 1995).

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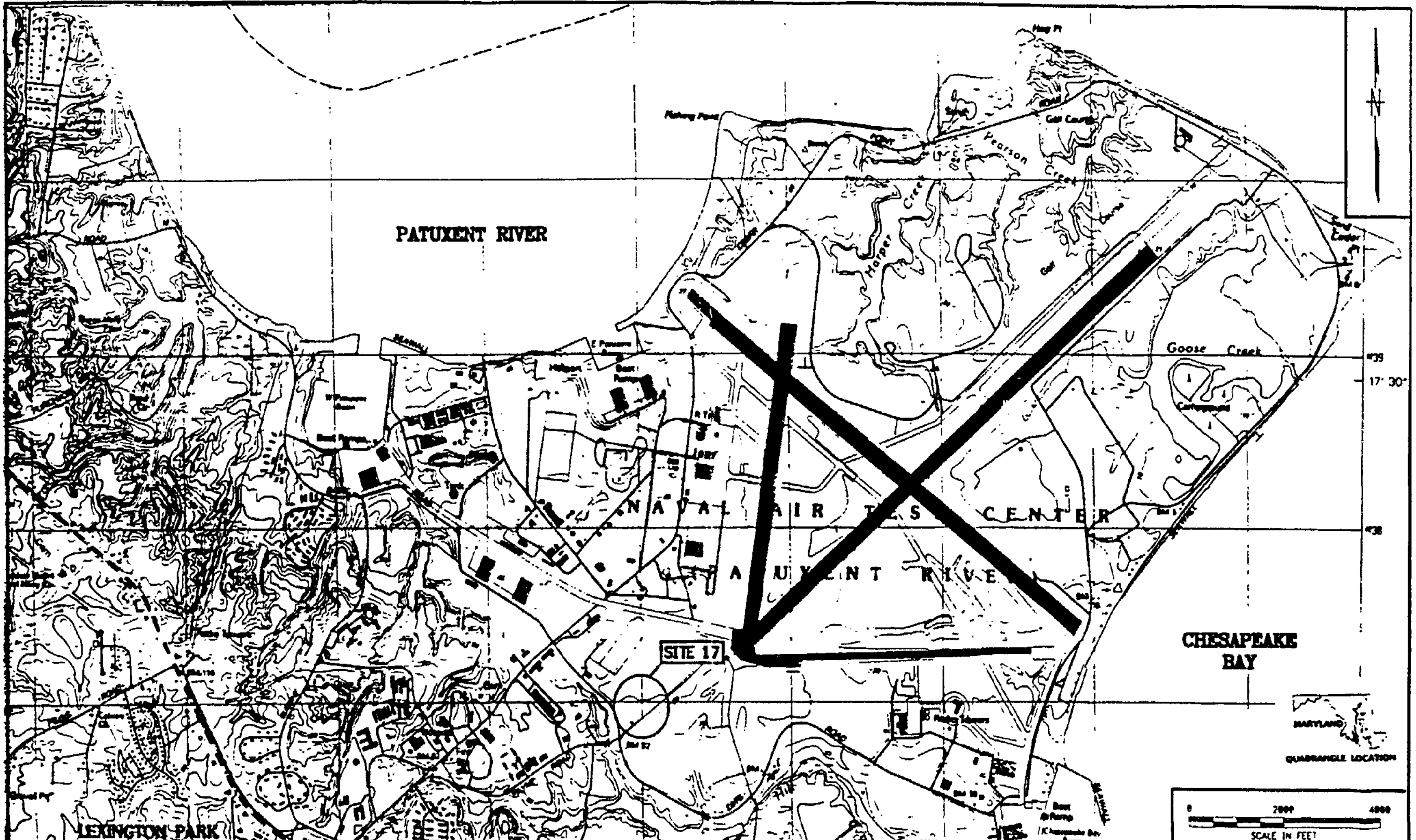

NO.	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DLT DATE 5/1/98
CHECKED BY DATE 07/30/98
COST/SCHED-AREA
SCALE AS NOTED

Brown & Root Environmental

FACILITY AND SITE 17 LOCATION MAP
NAS PATUXENT RIVER
MARYLAND

CONTRACT NO. 7194
OWNER NO. 0259
APPROVED BY
DATE 7-30-98
APPROVED BY
DATE
DRAWING NO. FIGURE 2-1
REV 0

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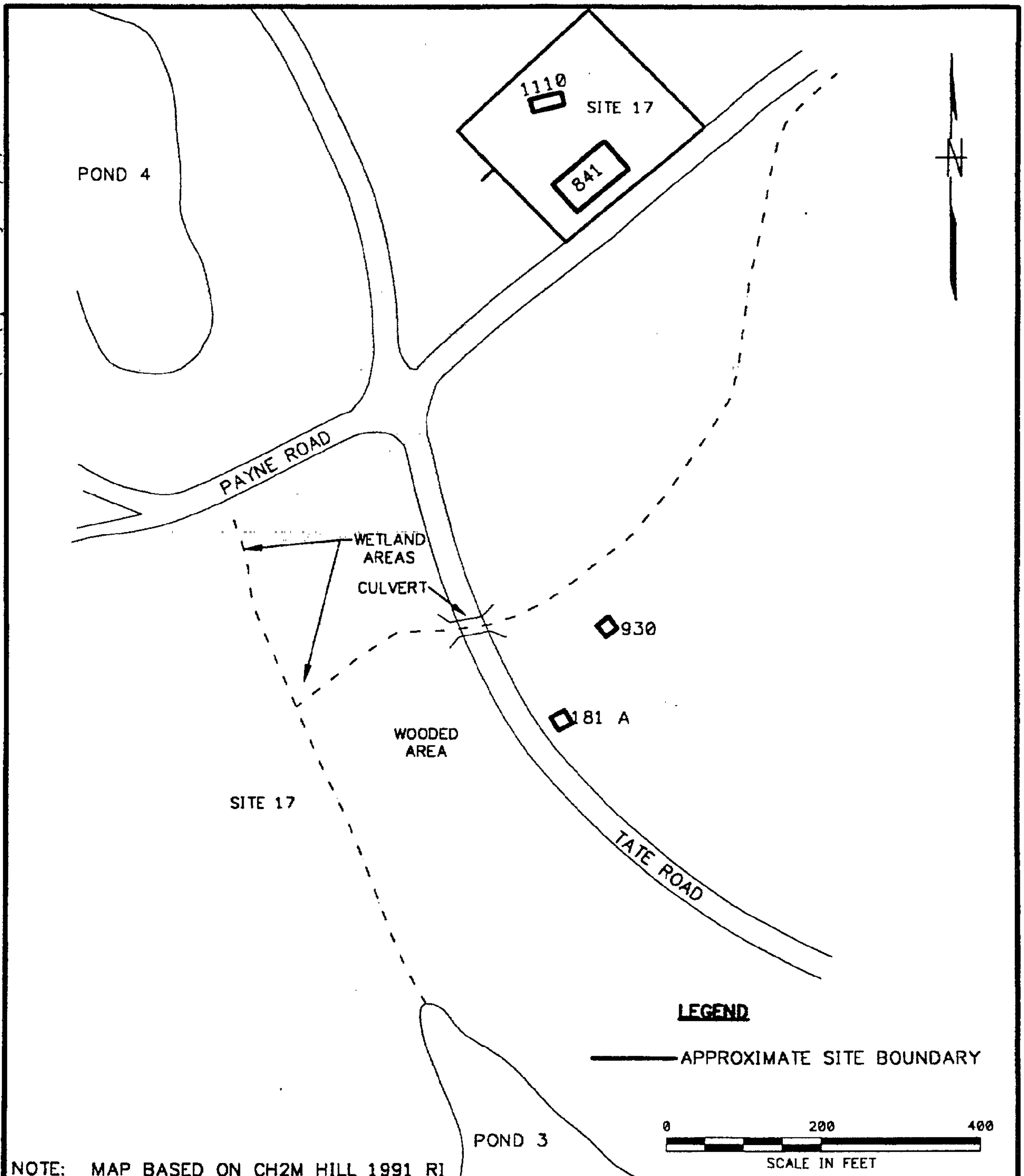
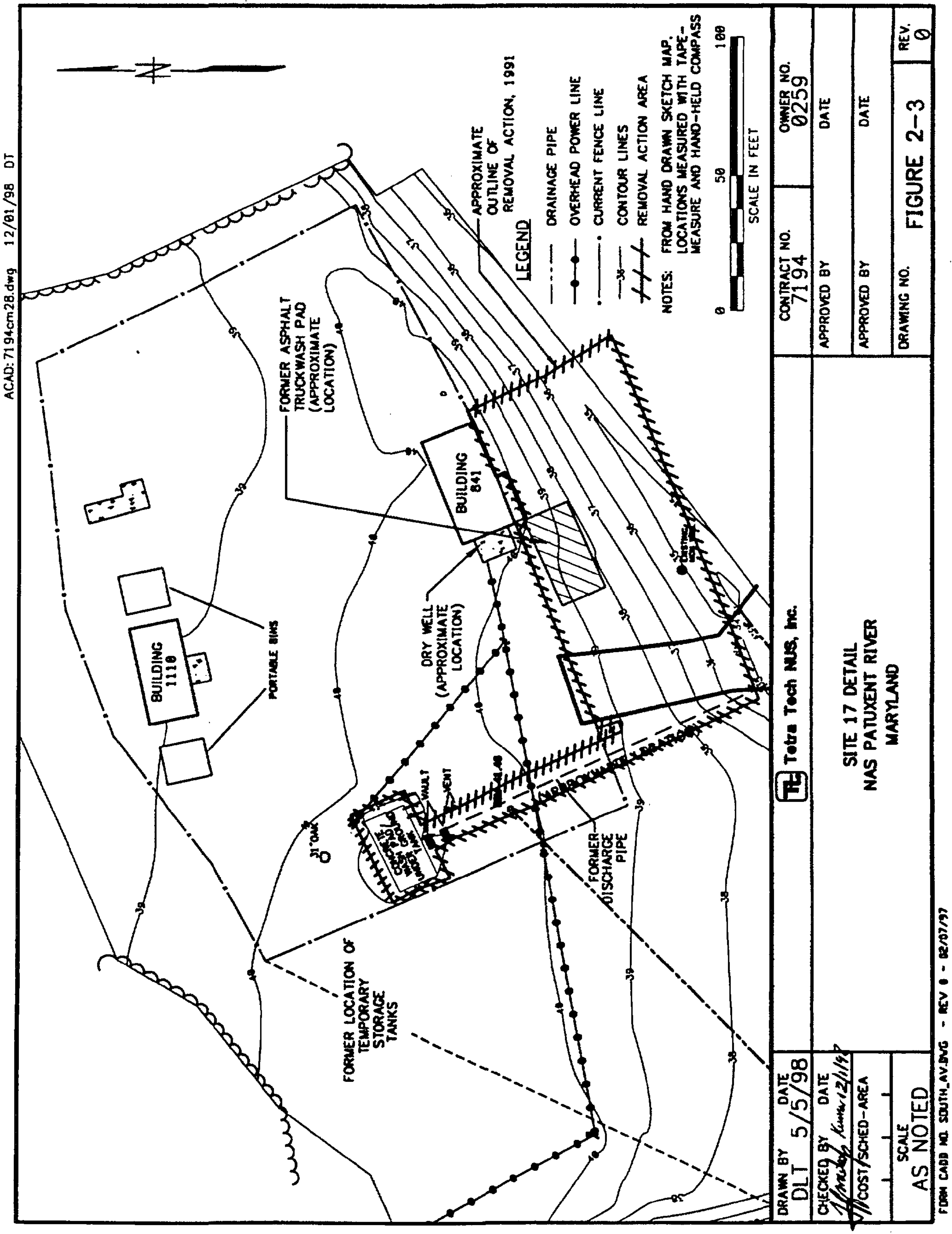


DRAWN BY DLT DATE 5/5/98	Brown & Root Environmental	CONTRACT NO. 7194	OWNER NO. 0259
CHECKED BY DATE 07/30/98	**SITE 17 AND IMMEDIATE SURROUNDINGS NAS PATUXENT RIVER MARYLAND**	APPROVED BY	DATE 7-30-98
COST/SCHED-AREA		APPROVED BY	DATE
SCALE AS NOTED		DRAWING NO. FIGURE 2-2	REV. 0

FORM CADD NO. SOUTH_AV.DWG - REV 0 - 02/07/97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N
APPROXIMATE OUTLINE OF REMOVAL ACTION, 1991
LEGEND
DRAINAGE PIPE
OVERHEAD POWER LINE
CURRENT FENCE LINE
CONTOUR LINES
REMOVAL ACTION AREA
NOTES: FROM HAND DRAWN SKETCH MAP. LOCATIONS MEASURED WITH TAPE-MEASURE AND HAND-HELD COMPASS
0 50 100
SCALE IN FEET
FORMER ASPHALT TRUCKWASH PAD (APPROXIMATE LOCATION)
BUILDING 841
BUILDING 1110
PORTABLE BINS
DRY WELL (APPROXIMATE LOCATION)
VAULT
VENT
FORMER DISCHARGE PIPE
FORMER LOCATION OF TEMPORARY STORAGE TANKS
Tetra Tech NUS, Inc.
SITE 17 DETAIL
NAS PATUXENT RIVER
MARYLAND
DRAWN BY DLT
DATE 5/5/98
CHECKED BY
DATE
COST/SCHED-AREA
SCALE AS NOTED
CONTRACT NO. 7194
OWNER NO. 0259
APPROVED BY
DATE
APPROVED BY
DATE
DRAWING NO. FIGURE 2-3
REV. 0
FORM CADD NO. SDIV_AV.DWG - REV 0 - 02/07/97

From 1962 to 1979, hand held spraying equipment was cleaned and rinsed into sinks in Building 841. The sinks were connected to an underground dry well system located at the northwestern corner of the building, as shown in the site detail in Figure 2-3. Pesticide containers were triple-rinsed in the sinks prior to being placed in the building dumpster. In addition, mixed unused pesticides and herbicides were also poured down these sinks. The sink discharges were connected to this dry well system until 1979. In 1979, a concrete wash pad/holding tank was constructed northwest of Building 841 and the sink's discharge was connected to the holding tank. Thus, in addition to receiving the rinse water from this pad, the holding tank also received the drainage from the sinks in Building 841. Rinse waters draining into this holding tank were periodically pumped out and disposed off site by a contractor. It has been estimated that between 300 and 400 gallons per day of rinse water were generated from the vehicle, equipment, and mixing sink washdowns. Building 1110 is a quonset hut that is reported to have been used for storage purposes, but may have also been used for mixing pesticides.

Prior to 1979, an asphalt pad adjacent to Building 841 was used for rinsing pest control vehicles. Therefore, until 1979, this rinse water drained onto the ground under the wash area or into a nearby drainage ditch along Payne Road. This drainage ditch drained into a culvert that passed under Tate Road and ultimately into Pond 3. In 1991, a removal action involving the sediments/soil in the drainage ditch, culvert, and surrounding areas was performed. Confirmatory sampling included in this removal action ensured that DDTR (total 4,4'-DDT, 4,4'-DDE, and 4,4'-DDD) and total chlordane concentrations did not exceed concentration limits. Confirmatory sampling verified that DDTR was below 4 mg/kg and total chlordanes were below 2 mg/kg.

2.2.2 <u>Previous Investigations</u>

The following is a summary of previous investigations and remedial activities conducted at Site 17 (details are presented in the Engineering Evaluation/Cost Analysis report, EE/CA [HNUS, April 1995]):

- An Initial Assessment Study (IAS) (NEESA, 1984) was performed to evaluate potentially contaminated sites at NAS. The IAS showed that 14 sites including Site 17 required further study to confirm or deny a problem at the sites.

- A confirmation study was performed by CH2MHill in 1985 and 1987. Soil, sediment and surface water samples were collected and analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and pesticides. Installation of monitoring wells, and sampling of groundwater for pesticides were also conducted.

- Fish from Pond 3 and a reference pond were collected and tissue samples were analyzed for pesticides herbicides and metals in 1985. Fishing activities were temporarily discontinued at Pond 3, then subsequently resumed with fish consumption limits.

- A State of Maryland inspection of the outfall from the storm water drain system for the concrete wash pad in 1989 revealed elevated concentrations of malathion and chlordane. The April 4, 1989, Site Complaint

- Number SC-0-89-091 stated that malathion was detected at 36,433 milligrams per kilogram (mg/kg) and chlordane was detected at 3,737 mg/kg. A malfunctioning valve on the holding tank was the cause of the release into the drain system. The stormwater bypass from the rinse pad was then discontinued.

- An Engineering Evaluation/Cost Analysis (EE/CA) (CH2M Hill, 1990) was conducted in 1990 to evaluate removal action alternatives for Sites 17 and 28. In support of this EE/CA, a pre-response action was performed by CH2MHill in 1989. Soil and sediment samples were collected and analyzed for chlorinated pesticides, organophosphorus pesticides, herbicides, and metals.

- In 1991, CH2MHill performed a removal action involving: excavation of soil in the drainage ditch along Payne Road; excavation of soil under a portion of Payne Road (including pavement); excavation of soil/sediment material in the culvert that passes under Payne Road; excavation of soil in the drainage ditch along Tate Road from Payne Road to the culvert passing under Tate Road; and excavation of the discharge pipe from the concrete pad to the drainage ditch along Payne Road and adjacent soil. The removal action included confirmatory sampling to ensure that total DDTR and dieldrin levels did not exceed the action level of 4 mg/kg and total chlordanes did not exceed the action level of 2 mg/kg. The depth of excavation ranged from 1.0 to 6.0 feet below ground surface.

- An interim remedial investigation (IRI) was performed by CH2MHill in 1992. This study involved additional soil, groundwater (including installation of additional monitoring wells), surface water, and sediment sampling. All media were analyzed for Target Compound List (TCL) pesticides, organophosphorus pesticides, and lead. Groundwater and sediments were also analyzed for herbicides. The IRI report was issued in 1994.

- Halliburton NUS (HNUS) conducted an engineering evaluation/cost analysis support investigation in 1994. This involved soil sampling and analysis for TCL pesticides to define the extent of contamination; groundwater sampling and analysis for TCL pesticides as a result of the IRI recommendation; and surface water and sediment sampling and analysis for TCL pesticides to further delineate the impact from the site. Sediment samples were also analyzed for leachability (i.e. the tendency to migrate) of pesticides by Toxicity Characteristic Leaching Procedure (TCLP) testing.

- HNUS prepared an Engineering Evaluation/Cost Analysis Report in 1995 (HNUS, 1995). This was prepared in support of a removal action at three sites, including Site 17. The focus was on evaluating removal action alternatives for soil and sediment, using an action level of 4 milligrams/kilogram for total DDTR and dieldrin.

- In 1997, a chemical fixation/solidification bench-scale treatability study was conducted by Brown & Root (B&R) Environmental for surface soil at this site. The study showed that the mobility of pesticides and

- metals of concern (as identified in earlier studies) was significantly reduced by treating the soil with cement and cement kiln dust.

- Also, in 1997, a thermal desorption and gas-phase destruction pilot-scale treatability study was conducted by Eli Eco Logic (Eli Eco, Logic, 1997) for surface soil at this site. The study showed that over 99 percent removal/destruction of pesticides in the soil can be achieved by thermal desorption at 550 to 600 EC (approximately 1000 EF) followed by reduction (reacting the pesticides in gas phase with hydrogen) to yield relatively innocuous compounds.

- A predesign sampling effort was conducted by B&R Environmental in 1997 to determine whether select metals are present in surface soil and to determine the geotechnical characteristics of the surface soil.

- In 1997, the Agency for Toxic Substances and Disease Registry (ATSDR) evaluated the environmental information on the 46 IR sites at NAS, including Site 17, and assessed the potential for human exposure at each site. The study concluded that none of the IR sites posed a current public health hazard.

- In 1998, B&R Environmental performed a focused feasibility study (FFS) for Operable Unit 1 (OU1) (TtNUS, 1998) which examined different remedial alternatives to address the soil contamination at Site 17. Navy presented the preferred remedial alternative at a public meeting an September 29, 1998. This FFS was the basis for developing the preferred alternative discussed in this ROD.

- In 1998, CH2M Hill collected and analyzed background soil samples for pesticides and inorganics at Site 17 (CH2M) Hill, October 16,1998).

2.2.3 <u>Enforcement Actions</u>

A site complaint (SC-0-89-091/April 4, 1989) was issued from the State of Maryland Department of the Environment (MDE) for the release of pesticides from a pad to a drainage ditch. Subsequent actions included the temporary banning of fishing in Pond 3, ceasing all operations at the Pesticide Shop, and initiating a removal action. A consent order (CO-91-105/December 26, 1990) was entered into with the MDE for the removal action. Fishing in Pond 3 has been resumed, with an individual consumption limit.

2.3 SCOPE AND ROLE OF RESPONSE ACTION AT SITE 17

Site 17 represents one component of a comprehensive environmental investigation and cleanup presently being performed at NAS Patuxent River. Past disposal operations at Site 17 have mainly contaminated the soil. The principal potential risks are from this medium. The National Contingency Plan (NCP) (40 CFR 300.430(a)(1)(ii)(A)) states "Sites should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phased analysis and response is necessary or appropriate given the size or completion of total site cleanup." Accordingly, the soil has been chosen as a separate operable unit (Operable Unit 1).

The selected remedial action identified in this ROD addresses Site 17, Operable Unit 1, i.e. soil contamination associated with Site 17 as identified in the Interim Remedial Investigation, Engineering Evaluation/Cost Analysis and Focused Feasibility Study reports. The selected remedy for this medium is identified and the rationale for selection is described in Section 2.8.

The selected remedy will reduce the potential risk to human health and the environment associated with site soils. The remedy consists of removal of above-ground and under-ground structures, the excavation of soil containing the highest concentrations of pesticides that pose a potential threat to human health and impact to groundwater, and the treatment of the excavated soil by incineration at a certified off site hazardous waste treatment facility. The selected remedy may also consist of placing a gravel cover and clean soil over the site if the remaining soil contains pesticides at levels that may pose a potential threat to ecological receptors. During the remedial design and remedial action (RD/RA) phase, site-specific soil toxicity tests will be conducted. The site-specific soil toxicity tests will consist of direct soil toxicity and bioaccumulation tests. The results of the site-specific soil toxicity tests will be used to complete the ecological risk assessment for soil at the site. If the site-specific soil tests reveal that the residual contaminated soil poses an unacceptable risk to ecological receptors, then the Navy shall construct a vegetated soil and gravel cover over contaminated soil. The soil and gravel cover will eliminate the pathway of exposure between the soil and ecological receptors. The soil cover will be vegetated to minimize erosion. Cap maintenance, monitoring of cap integrity, and verification of cap efficacy, as necessary will also be conducted.

This remedy is consistent with long-term remedial goals for Site 17. The selected remedial action will remove the soil that poses the principal threat to human health from contact with the soil, which includes soil containing contaminants that could migrate into the groundwater and adversely impact it. The selected remedy will also minimize the risk arising from potential exposure to soil by ecological receptors. The gravel layer and soil cover will eliminate the pathway of exposure to ecological receptors. This remedy will not address groundwater or surface water and sediment in Pond 3 at the site. Remediation of these other media, if necessary, will be addressed in the final ROD for the site.

2.4 SUMMARY OF SITE CHARACTERISTICS

Several investigations have been conducted at this site as summarized in Section 2.2.2. The following is a summary of the findings related to the surface soil contamination at this site.

2.4.1 <u>Description of Contamination</u>

This section provides a summary of the analytical data for soil samples that were collected during previous investigations at this site. Table 2-1 provides an overall summary of the analytical results from the Interim Remedial Investigation and the 1994 EE/CA field activities. The surface soil data presented herein was obtained from investigations that were performed after the 1991 removal action.

As shown by the data presented in Table 2-1, pesticides, in particular, 4,4'-DDT, 4,4'-DDD, and 4,4'-DDE (collectively referred to as DDTR) were the most widely detected and present at the highest concentrations.

2.4.2 <u>Contaminant Migration</u>

Contaminant transport modeling was used to predict the potential migration of contamination from the soil into the groundwater at the site. The potential impact of further transport of the contaminants through groundwater to the surface water and sediment at Pond 3 was also assessed.

TABLE 2-1

SUMMARY OF SOIL ANALYTICAL RESULTS
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

Parameter	Range of Detected Concentrations	Frequency of Detection
PESTICIDES (BACKGROUND SOIL RANGE[3]) (microgram per kilogram, Fg/kg)		
Heptachlor (ND)	79	1/20
Aldrin (ND)	109 - 26,000	2/39
Heptachlor Epoxide (ND)	670	1/20
Dieldrin (ND)	720 - 37,000	7/39
4,4'-DDE[1] (0.34 – 670)	13 - 76,000	39/39
Endrin (ND)	130	1/20
4,4'-DDD[1] (1.75 – 10.5)	5.7 – 1,800,000	33/39
4,4'-DDT[1] (0.43 – 240)	6.1 – 5,000,000	39/39
Methoxychlor (ND)	22,000	1/20
Alpha-Chlordane[2] (ND)	2,000 - 28,000	3/39
Gamma-Chlordane[2] (ND)	2,900 - 27,000	2/39
METALS (BACKGROUND SOIL RANGE[3])(milligram per kilogram, mg/kg)		
Lead (7.2 – 25.1)	8.9 – 447	19/19
Arsenic[4] (1.4 – 4.1)	2.3 - 35.1	5/5

ND: Not Detected
1 The maximum background value of total DDTR = 810 µg/kg.
2 Fixed-base laboratory analytical results for chlordane.
3 Obtained from CH2M Hill Technical Memorandum (October 16, 1998).
4 Arsenic was detected only in samples collected during a pre-design investigation by B&R Environmental, 1997.

The following detected pesticides and inorganics were evaluated in the modeling for migration of soil contaminants via groundwater:

- 4,4'-DDD
- 4,4'-DDE
- 4,4'-DDT
- Dieldrin
- Aldrin
- Alpha and Gamma Chlordanes
- Endrin
- Heptachlor
- Heptachlor Epoxide
- Methoxychlor
- Arsenic
- Lead

The above listed contaminants include those that were detected at concentrations exceeding default Soil Screening Levels (SSLs) obtained from EPA guidance (EPA, 1996), as noted on Table 2-2. Under a no action scenario, using conservative assumptions considering maximum detected concentrations, the following contaminants were predicted to have the potential to violate groundwater standards:

- Dieldrin
- Arsenic
- Lead

The groundwater standards chosen were either Maximum Contaminant Levels (MCLs) under the Safe Drinking Water Act or Tap Water Risk Based Concentrations (RBCs) from EPA Region Ill. The modeling predicted that the concentration of dieldrin would exceed its RBC of 0.0042 Fg/L, lead would exceed its action level of 15 Fg/L, and arsenic would exceed its MCL of 50 Fg/L.

The predicted increases in concentrations of dieldrin, arsenic and lead were: 0.037 Fg/L, 73.6 Fg/L, and 28.9 Fg/L, respectively. The current concentrations of dieldrin in the groundwater (noted on Table 2-2) already exceed the Region Ill Tap-water RBC value, therefore dieldrin is a contaminant of concern (COC) that has already migrated from the soil to the groundwater and has a potential to continue to migrate.

TABLE 2-2

SOIL DATA COMPARED TO Soil Screening Levels (SSLs) AND GROUNDWATER DATA
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

Parameter	Soil Concentration Range (Fg/kg)	Frequency of Detection In Soil	Soil Screening Levels (Fg/kg) for Groundwater Protection	Groundwater Concentration Range(3) (Fg/L)	Frequency of Detection in Groundwater
PESTICIDES					
Heptachlor	79	1/20	23,000	0.01U	0/7
Aldrin	109 - 26,000	2/39	500	0.01U	0/7
Heptachlor Epoxide	670	1/20	700	0.0067-0.0088	2/7
Dieldrin	720 - 37,000	7/39	4	0.052-0.46	6/7
4,4'-DDE	13 - 76,000	39/39	54,000	0.01	1/7
Endrin	130	1/20	1,000	0.0058	1/7
4,4'-DDD	5.7 - 1,800,000	33/39	16,000	Not Analyzed	NA
4,4'-DDT	6.1 - 5,000,000	39/39	32,000	0.0046-0.1	3/7
Methoxychlor	22,000	1/20	160,000	0.092	1/7
Alpha-Chlordane	2,000 - 28,000	3/39	10,000	0.0091-0.11	4/7
Gamma-Chlordane	2,900 - 27,000	2/39	10,000	0.0094-0.14	4/7
METALS					
Lead	8.9 – 447 mg/kg	19/19	None Specified	1.1-5.7	5/7
Arsenic	2.3 – 35.1 mg/kg	5/5	29 mg/kg	4.5-6.1	2/7

1 Background value for total DDTR: DDE + DDT is reported to be approximately 810 µg/kg (CH2M Hill, October 16, 1998
2 Analysis performed by a fixed-base laboratory for chlordane.
3 Groundwater data was obtained from October 1996 and March 1997 sampling events, which is available in a memo from CH2M Hill to EFA Chesapeake.
U: Not detected at the detection limit noted.

Shaded cell indicates that the soil concentration exceeds SSL.

However, the current concentrations of arsenic and lead (also noted on Table 2-2) do not exceed their respective groundwater standards. While there is a potential for both of these elements to continue to migrate from the soil into the groundwater as predicted by the modeling results, only arsenic was retained a COC in addition to dieldrin for RC development. In accordance with risk assessment procedures, lead was not retained as a COC because the EPA toxicologist input the mean soil lead concentration (91.7 mg/kg) and the mean groundwater lead concentration (5.2 ug/l) in the Integrated Exposure Uptake Biokinetic Model for Lead in Children. The model predicted the mean concentration of lead (in ug/dl) in children ages 0 to 84 months to be 3.3 ug/dl and 0.82 % of children are predicted to have a blood lead level of 10 ug/dl. EPA considers risk to children unacceptable when more than 5% of the children are predicted to have blood lead concentrations 10 ug/dl. Therefore, risk posed by lead in soil is within acceptable limits under EPA guidance. However, arsenic and dieldrin were retained as COCs at the site to protect groundwater.

The modeling results showed that none of the contaminants of concern (COCs) would exceed surface water standards at the boundary of Pond 3. Therefore, potential remedial actions at the site should address minimization of infiltration or reduction of concentration or mobility of arsenic and dieldrin for protection of groundwater only. Details of the modeling process and results are presented in Appendix A of the FFS (TtNUS, September 1998).

Contaminant migration through the surface runoff pathway was considered for its potential to occur via erosion of contaminated surface soil followed by drainage into the ditch south of Building 841 along Payne Road. No pathways of surface water/sediment migration away from the site other than this drainage ditch are known. It was noted that the areas of soil contamination south of Building 841 that could have had the greatest potential to contribute to surface runoff to the drainage ditch were excavated during the removal action in 1991, and the excavated areas were backfilled to grade and covered with top soil and vegetation. The remaining portion of the

site is not expected to contribute to contaminant migration through the surface runoff pathway owing to the presence of erosion-retarding features such as gravel-covered areas and concrete pads. Moreover, the presence of a vegetated area south of Building 841 hydraulically downgradient of the contaminated soil, but upgradient of the ditch, is expected to further retard contaminant migration due to surface water flow from areas north of the building. Therefore, contaminant migration through the surface runoff pathway was not considered as a significant pathway, and was not further evaluated.

2.5 SUMMARY OF SITE RISKS

Potential human health and ecological risks associated with exposure to contaminated media at Site 17 were evaluated as part of the FFS. Although the current and potential (reasonably foreseeable) future land use at the site is expected to be industrial, other scenarios of uncontrolled use were also evaluated. Also, even though no current ecological receptors have been identified at the site, in the event that the site is abandoned, it could become an ecological habitat and risks to potential receptors in such a hypothetical habitat were also evaluated. Based on the estimated potential risks to receptors, Remediation Criteria (RC) were developed for COCs in surface soil to establish concentrations that would reduce human health and ecological risks to acceptable levels. Although there are no current groundwater users at the site and no future groundwater users are expected, groundwater protection RC were also developed for COCs in the soil.

2.5.1 Human Health Risks

The receptors evaluated in this risk evaluation were: future adult and child residents, current and future site workers, future construction workers, and current adult and child trespassers. Each receptor was evaluated based on exposure to soil through incidental ingestion, dermal contact and inhalation of dust particles. Chemicals present in the soil were selected for detailed evaluation based on a comparison of their concentrations with screening levels. Chemicals with concentrations exceeding screening levels were identified as chemicals of potential concern (COPCs). COPCs were selected in accordance with the screening procedure outlined in U.S. EPA Region III guidance (EPA 1993). Chemicals detected at concentrations greater than the screening levels were then evaluated for their potential to cause a cumulative incremental cancer risk (ICR) or cumulative hazard index (HI) using Cancer Potency Factors (CPFs) or Reference Doses (RfDs), respectively.

Aldrin, dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and alpha and gamma chlordane were identified as COPCs. Arsenic and lead were also detected in the soil samples. Lead concentrations were below screening levels, and therefore not retained in the risk calculation as detailed in the FFS (TtNUS, 1998) and subsequent review by EPA.

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. An excess lifetime cancer risk is the increase in likelihood of developing cancer during one's lifetime because of exposure to site-specific chemicals. The term "upper bound" reflects the conservative estimate of the risks calculated from the CPFs. Use of this approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by EPA to indicate the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Calculation of Exposure Point Concentrations

Exposure point concentrations are estimated chemical concentrations that a receptor may contact and are specific to each exposure medium. Exposure concentrations were calculated assuming the data were lognormally distributed. The exposure concentration is represented by the lesser of the maximum detected concentration and the 95% upper confidence limit of the mean (UCL) of the lognormal distribution.

The statistical analysis of the data and the exposure point concentrations for COPCs are summarized in Table 2-3. The exposure point concentrations for these COPCs are also presented in the risk calculation tables in Appendix B of the FFS (TtNUS, 1998).

Exposure Assessment

The receptors evaluated in this risk evaluation were as follows:

- future adult and child residents,
- current and future site workers,
- future construction workers, and
- current adult and child trespassers.

TABLE 2-3

STATISTICAL SUMMARY OF DATA FOR HUMAN HEALTH COPCs
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

Chemical	Frequency of Detection	Maximum Detection (mg/kg)	Minimum Detection (mg/kg	Arithmetic Mean (mg/kg)	Standard Deviation (mg/kg)	95% UCL[1] (mg/kg)	ECP[2] (MG/KG)
Aldrin	2/39	26	0.19	0.8	3.9	15.6	15.6
Dieldrin	7/39	37	0.72	3.9	8.7	1.8E04	37
4,4'-DDE	39/39	78	0.013	11.6	18.2	178	78
4,4’-DDD	33/39	1800	0.006	58.5	272	5.9E04	1800
4,4'-DDT	33/39	5000	0.006	332	954	1.0E04	5000
Chlordanes	3/39	55	2.0	1.6	8.3	27.4	27.4

1 Represents the 95% upper confidence limit of the arithmetic mean of the log-transformed data
2 Exposure Point Concentration—lesser of the Maximum Detection and the 95% UCL

Each receptor was evaluated based on exposure to soil through incidental ingestion, dermal contact, and inhalation of dust particles. The exposure assumptions are summarized in Table 2-4 and presented in the risk calculation tables in Appendix B of the FFS (TtNUS, 1998).

The intake equations for incidental ingestion, dermal contact and inhalation of dust particles are identical to those outlined in EPA's Risk Assessment Guidance for Superfund (USEPA, 1989). These intake equations require specific exposure parameters for each exposure pathway. Exposure parameters are often assumed values, and their magnitude influences the estimates of potential exposure and risk. The reliability of the values chosen can also contribute substantially to the uncertainty of the resulting risk assessments. Many of the exposure parameters have default values, which were used in this risk assessment. These assumptions, based on estimates of body weights, media intake levels, and exposure frequencies and durations are provided by EPA guidance. The equations are presented in the risk calculation tables in Appendix B of the FFS (TtNUS, 1998).

Toxicity Assessment

Toxicity assessment defines the relationship between the magnitude of exposure and possible severity of adverse effects, and weighs the quality of available toxicological evidence. This assessment results in the development of toxicity criteria (e.g., reference doses and cancer slope factors). The toxicity criteria used in this risk assessment are from EPA's Integrated Risk Information System (IRIS) (EPA 1998b) and Health Effects Assessment Summary Table (HEAST) databases (EPA 1997b). The toxicity criteria for the COPCs in this risk assessment are summarized in Table 2-5. In instances where no toxicity criterion was available for a specific pathway, that pathway was not evaluated.

Risk Characterization

Risk characterization is the process of integrating the previous elements of the risk assessment into quantitative expressions of risk. These risks are then used in remedial decision-making, defining preliminary remediation goals, and selecting potential remedies or actions, The potential human health risks are discussed in terms of carcinogenic and noncarcinogenic effects.

The potential for carcinogenic effects due to exposure to site-related contamination is evaluated by estimating the incremental excess lifetime cancer risk. The risk is the incremental increase in the

TABLE 24

EXPOSURE FACTORS FOR HUMAN HEALTH EVALUATION (REASONABLE MAXIMUM EXPOSURE)
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS, PATUXENT RIVER, MARYLAND

	Current and Future Scenarios			Future Scenario		
	Site Worker	**Recreational/ Trespasser (Child)**	**Recreational/ Trespasser (Adult)**	**Child Resident**	**Adult Resident**	**Construction Worker**
General Receptor Factors						
Body weight	70.0[a]	15.0[a]	70.0	15.0[a]	70.0[a]	70.0[a]
Inhalation rate (m^3/day)	20.0[a]	12.0[b]	20.0[a]	12.0[b]	20.0[a]	13.6[c]
Exposure duration (years)	25.0[a]	6.0[a]	6.0[a]	6.0[a]	24.0[a]	1.0[a]
Media-Specific Factors						
Soil (Surface/Subsurface):						
Ingestion rate (mg/day)	100.0[a]	200.0[a]	200.0[a]	200.0[a]	100.0[a]	480.0[d]
Exposure frequency (days/year)	250.0[a]	104.0[a]	350.0[a]	350.0[a]	350.0[a]	250.0[a]
Skin surface area (cm^2)	5,300[f,g]	4,520[d,g]	4,520[d,g]	4,520[d,g]	5,300[f,g]	5,300[f,g]
Soil to skin adherence factor (mg/cm)	1.0[f]	1.0[f]	1.0[f]	1.0[f]	1.0[f]	1.0[f]

a = [c] EPA. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors, OSWER Directive 9285.6-03, March 25, 1991. (Soil exposure factors used for sediment.)

b = [e]EPA Region III, Risk-based Concentration Table, March 1997

c = [k]EPA. Exposure Factors Handbook. USEPA/6008-89-043, June 1995. For adults during moderate activity.

d = [b]EPA. Exposure Factors Handbook, USEPA/600/8-89-043, June 1995.

e = [h]Professional judgement assuming 2 days per week for 52 weeks per year.

f = [d]EPA. Dermal Exposure Assessment: Principles and Applications, January 1992.

g = [j]Skin surface area in contact with soil are based on body part exposed: for the adult resident, head hands, forearms, and lower legs; for the child resident, head, hands, arms, feet and legs; for the adult worker, the head, hands, and forearms. For sediment, assumed 30 percent total surface area (hands, forearms, lower legs, and feet) for a residential/recreational/trespasser child aged 4 to 5 years, youth age 6 to 16, and adult worker.

TABLE 2-5

TOXICITY CRITERIA FOR HUMAN HEALTH
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS, PATUXENT RIVER, MARYLAND

		Reference Doses (RfD)			Cancer Slope Factors (CSF)		
Chemical	**Absorption Efficiency(1)**	**Oral**	**Inhalation**	**Dermal (2)**	**Oral**	**Inhalation**	**Dermal (3)**
Aldrin	0.5	3E-05	-	1.5E-05	17	17	34
Dieldrin	05.	5E-05	-	2.5E-05	16	16.1	32
4,4'-DDE	0.89	-	-	-	0.34	-	0.38
4,4'-DDD	0.89	-	-	-	0.24	-	0.27
4,4'-DDT	0.89	5E-04	-	4.5E-04	0.34	0.34	0.38
Chlordanes	0.8	5E-04	-	4.0E-04	0.35	0.35	0.44

1 Absorption Efficiency - Fraction of gastrointenstinal absorption.
2 Dermal Reference Dose = Oral Reference Dose x Absorption Efficiency
3 Dermal Cancer Slope Factor = Oral Cancer Slope Factor / Absorption Efficiency

probability of developing cancer during one's lifetime in addition to the background probability of developing cancer. It is defined by the equation:

Risk = Intake x CSF

where

Intake = amount of chemical taken into the body by a given exposure pathway

CSF = cancer slope factor for a specific chemical by a given exposure pathway

The risks for the various exposure pathways are summed to derive a cumulative risk, If the cumulative risk exceeds 1E-04 (one in ten thousand), CERCLA generally requires that remedial action be undertaken at the site.

The potential for noncarcinogenic effects due to exposure to site-related contamination is evaluated by estimating the hazard quotient. The hazard quotient is the ratio of the intake to the chemical's corresponding reference dose to determine if a threshold exposure has been exceeded. The hazard quotient is defined by the equation:

Hazard Quotient = Intake/ RfD

where

Intake = amount of chemical taken into the body by a given exposure pathway

RfD = reference dose for a specific chemical by a given exposure pathway

The hazard quotients for the various exposure pathways are summed to derive a hazard index. If the hazard index exceeds one, a certain degree of health risk is indicated. This approach assumes that noncarcinogenic hazards are additive. Synergistic or antagonistic interactions between chemicals are not considered. The hazard index may exceed unity even if all of the individual hazard quotients are less than one. The chemicals may then be segregated by similar mechanisms of toxicity in order to derive separate hazard indices for specific target organs.

The cumulative incremental cancer risks (ICR) for all exposure pathways ranged from 2.3E-04 (2 in 10,000) for the future construction worker to 6.8E-03 (7 in 1,000) for the future resident (Table 2-6). The risks for both the future construction worker and future resident are primarily attributed to 4,4'-DDT, 4,4'-DDE and 4,4'-DDD. The noncarcinogenic hazard indices for all exposure pathways are greater than the EPA's benchmark of one which suggests that exposure to the COPCs is likely to result in adverse systemic health effects.

Because the cancer risks for the COPCs exceeded the EPA's target risk level of 1E-04 and the hazard index of one, all the COPCs are being retained as Contaminants of Concern (COCs) for Remediation Criteria (RC) development.

2.5.2 Environmental Evaluation

A screening-level ecological risk assessment was conducted to evaluate impacts to potential receptors in the environment. The screening-level ecological risk assessment selected contaminants based on maximum concentrations exceeding EPA Region III Biological Technical Action Group (BTAG) screening levels. Screening levels are concentrations of contaminants that have been observed to not have adverse effects on plants or animals in the environment. The maximum detected concentrations of these contaminants were divided by the screening level to obtain hazard quotients. If the hazard quotients exceeded 1.0 or if no screening level was available, then the contaminant was retained as a contaminant of potential concern. Table 2-7 presents a summary of the maximum hazard quotients associated with detected COPCs whose concentrations exceeded screening levels. Endrin was detected in only one sample out of 20, and its concentration was low enough to cause a HI that barely exceeded 1.0. Therefore, it was not retained as a COC for RC development. Heptachlor was not retained as a COC because its maximum hazard quotient was less than 1.0.

These COCs have been selected based on literature screening values, therefore a site-specific toxicity study will be required to verify the potential impact to ecological receptors and to accordingly determine an ecological RC.

TABLE 2-6

SUMMARY OF HUMAN HEALTH RISKS
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS, PATUXENT RIVER, MARYLAND

		Noncarcinogenic Risks Hazard Quotients			Carcinogenic Risks Incremental Cancer Risks			
Receptor		**Ingestion**	**Dermal**	**Total**	**Inhalation**	**Ingestion**	**Dermal**	**Total**
Resident	Adult	15.5	9.95	25	3.11E-07	4.74E-03	2.06E-03	6.8E-03
Resident	Child	145	39.6	185	NA	NA	NA	NA
Trespasser	Adult	4.61	2.96	7.6	5.44E-08	4.22E-04	3.06E-04	7.3E-04
Trespasser	Child	43	127	170	3.80E-08	9.85E-04	3.05E-04	1.3E-03
Site Worker	Adult	11.1	7.1	18	1.36E-07	1.06E-03	7.67E-04	1.8E-03
Construction Worker	Adult	53.1	7.1	60	3.70E-09	2.03E-04	3.07E-05	2.3E-04

TABLE 2-7

SUMMARY OF MAXIMUM HAZARD QUOTIENTS FOR ECOLOGICAL COPCs
OPERABLE UNIT 1, SOIL
SITE 17: PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

COPC	Screening Levels(mg/kg)	Maximum Hazard Quotient
4,4'-DDD	0.1	18,000
4,4'-DDE	0.1	760
4,4'-DDT	0.1	50,000
Aldrin	0.1	260
Alpha-Chlordane	0.1	280
Gamma-Chlordane	0.1	270
Dieldrin	0.1	370
Endrin	0.1	1.3
Heptachlor	0.1	0.79
Heptachlor Epoxide	0.1	6.7
Methoxychlor	0.1	220
Arsenic	NA	NA
Lead	0.1	44,700

2.5.3 Development of Remediation Criteria (RC)

This section develops remediation criteria (RC) for Site 17. The RC development is limited to soil at the site considering potential hypothetical human receptors. Table 2-8 presents a summary of RC for human health and groundwater protection.

2.5.3.1 Human Health RC

Remediation Criteria (RC) are developed to ensure that contaminants remaining on site are at levels that are protective of human health. Of the receptors likely to be exposed to soils at Site 17, the site worker and the child trespasser are the most sensitive. The cancer risk for the future residential receptor and the noncancer risk for the future child residential receptor are greater than that of the site worker and the child trespasser, respectively, but it is highly unlikely that the site will ever be used for residential purposes. Since the most reasonable plausible site use is likely to be for industrial purposes, RC were developed only for protection of the site worker and the child trespasser.

RC were developed for the following pesticides that were identified as COCs: aldrin, dieldrin, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT and chlordanes. The RC were developed using the exposure point concentrations and exposure assumptions that were used to evaluate potential risk. These exposure point concentrations (EPC) were proportioned to yield concentrations with a target cancer risk equal to 1E-06:

$$\text{RC (carcinogenic)} = \text{(EPC) (1E-06) / (Calculated Risk Level)}$$

In similar fashion, these exposure point concentrations were proportioned to yield concentrations with a target hazard quotient of 0.25:

$$\text{RC (noncarcinogenic)} = \text{(EPC) (0.25) / (Calculated Hazard Index)}$$

A hazard quotient of 0.25 was selected because four of the six contaminants at Site 17 are evaluated as noncarcinogens. All four contaminants contribute to the toxicity of the liver. Because the effects of the contaminants on the liver are assumed to be additive and the benchmark for noncarcinogenic risk is equal to one, it follows that the target hazard quotient for each contaminant should be one fourth of the target value, hence a target hazard quotient of 0.25.

TABLE 2-8

SUMMARY OF HUMAN HEALTH AND GROUNDWATER PROTECTION RC OPERABLE UNITI, SOIL SITE 17: PESTICIDE SHOP NAS PATUXENT RIVER, MARYLAND

Parameter	Human Health RC Parts Per Million (PPM) or Milligrams Per Kilogram (mg/kg)		Groundwater Protection
	ICR=1E-06	**HQ = 0.25**	RC
Aldrin	0.08	0.3	NA
Dieldrin	0.09	0.6	0.08
4,4'-DDD	7.5	NA	NA
4,4'-DDE	5.2	NA	NA
4,4'-DDT	5.3	8.9	NA
Chlordanes	5.0	8.0	NA
Heptachlor Epoxide	---	---	NA
Methoxychlor	---	---	NA
Arsenic	9.0*	---	23
Lead	---	---	NA

ICR = Incremental Cancer Risk
HQ = Hazard Quotient
NA - Not Applicable
Concentrations are in mg/kg (ppm).
* Based upon average concentration of 1 x 10E-4 (20 mg/kg) and 1 x 10E-5 (2 mg/kg)

For all of the COCs, the RC developed based on carcinogenic risk is more restrictive than the RC developed based on noncarcinogenic risk. Attainment of the RC corresponding to an ICR of 1E-06 for industrial receptors would result in an ICR of 8.5E-05 for a future adult resident and HI of 1.2 for the future child resident, if the effect of arsenic is excluded. Based upon EPA toxicological review, the arsenic RC to protect groundwater under residential and industrial exposures would result in a residual risk of arsenic and these residual levels would pose an unacceptable risk (i.e. cancer risk greater than 1x 10E-4) for humans exposed to soil through inhalation, accidental ingestion, or skin contact. As a result, the average concentration of arsenic that will be protective of human health, considering residential and industrial exposure to soil, was selected as the RC. The arsenic RC level is 9.0 mg/kg. This is the average between 2 mg/kg, which would result in a 1 x 10E5 and 20 mg/kg, which would result in a 1 x 10E-6. Although residential use is unlikely at this site, the residential ICR and HI would meet the EPA's acceptable ICR range of 1E-04 to 1E-06 and HI upper limit of 1.0. This suggests that institutional controls may not be required for the site for humans. As a result, we will evaluate the risk following cleanup.

2.5.3.2 Groundwater Protection RC

Groundwater protection RC were being developed for the following COCs that were selected in Section 2.4.2: dieldrin and arsenic. These RC are residual concentrations in soil that would not adversely impact the groundwater.

Because the current groundwater concentrations of dieldrin already exceed the RBC, its soil RC was aimed at minimizing its migration from soil to levels that are below the detection limit of dieldrin. Therefore, the RC for dieldrin will be set at levels that would reduce the soil leachate concentration (prior to its entrance and mixing/dilution in groundwater) to levels below dieldrin's Contract Required Quantitation Limit (CRQL) of 0.02 µg/L. Analysis to levels below 0.02 µg/L for dieldrin is not considered practical.

The RC for arsenic was be developed to be less stringent criteria because the current groundwater concentrations of this element are at an average of 4 µg/L, which is well below arsenic's MCL of 50 µg/L Therefore, the RC for arsenic will be aimed at attaining a future groundwater concentration (after mixing/dilution) of soil leachate equal to 50 µg/L.

Based on these criteria, modeling was used to develop soil RC for dieldrin and arsenic as follows:

- Dieldrin: 84 µg/kg
- Arsenic: 23 mg/kg

Details of the model calculations are presented in Appendix A of the FFS (TtNUS, 1998).

2.5.4 Assessment of Site 17 Risk and Contaminated Soil Volume

DDTR are the most prevalent contaminants at the site. Because of the widespread occurrence of DDTR (compared to other COCs) at levels that exceed both human health RC and background levels, the area and depth of contaminated soil is expected to be defined by the sample locations where the DDTR levels exceed these cleanup levels. Since a majority of the soil samples that were collected from the site were surface soil samples and reported as total DDTR of 18 mg/kg (i.e., DDT+DDE+DDD) concentrations, the extent of contamination was determined in the FFS on the basis of total DDTR concentrations exceeding cleanup levels also expressed as total DDTR.

Figure 2-4 shows the soil sample locations with total DDTR concentrations. The hatched area in Figure 2-4 delineates the approximate horizontal extent of soil contamination where DDTR concentrations exceeded the 1-2 mg/kg range, which is slightly higher than the background value of 0.81 mg/kg. This area is an estimate of the approximate maximum extent of soil that may need to be addressed for ecological protection. The need for, and the actual extent of, the area will be determined based on site-specific ecological cleanup levels to be developed from a site-specific toxicity study that will be conducted during the remedial design/action phase.

The estimated area of soil contamination within the hatched area on Figure 2-4 is 51,000 square feet. The average depth of contamination is assumed to be approximately 2.0 feet based on data from a limited number of soil samples that were collected from depths below 1.5 feet. Based on this estimated area and assumed depth, the estimated volume of contaminated soil that contains DDTR at levels that exceed the 1-2 mg/kg range is approximately 3,800 cubic yards (5, 100 tons).

Figure 2-4 also delineates the approximate horizontal extent of soil contamination where human health RC are exceeded (shown as a cross-hatched area) within the hatched area. The total estimated area of soil contamination is 13,400 square feet. Based on data from a limited number of samples collected from depths below 1.5 feet, as mentioned above, the average depth of contamination that poses a risk to humans is also assumed to be 2.0 feet. Based on this estimated area and the previously assumed depth of contamination of 2.0 feet, the estimated volume of soil that poses a risk to humans is approximately 1,000 cubic yards (1,350 tons). Sample locations where the highest concentrations of arsenic and dieldrin could potentially impact groundwater are also included within the hot-spots. Details of the volume estimates are presented in Appendix C of the FFS (TtNUS, 1998).

2.6 DESCRIPTION OF ALTERNATIVES

Based on an evaluation of site conditions, potential risks, and legal requirements for Site 17, three remedial action objectives were identified to protect the public from potential current and future health risks, as well as to protect the environment:

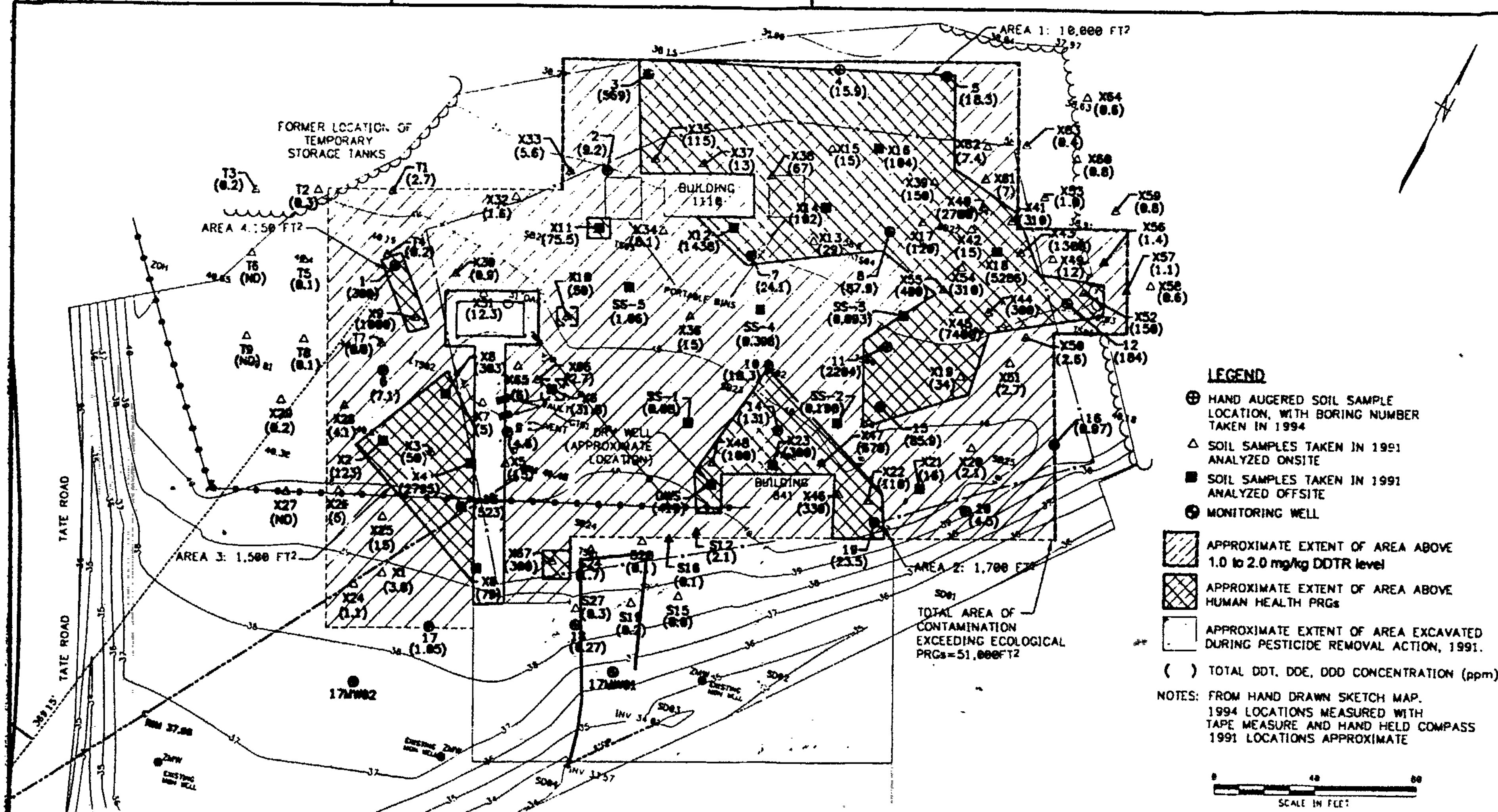
- Protection of potential human receptors from direct exposure to soil, containing pesticides at levels exceeding human health RC.

- Protection of potential ecological receptors from direct exposure to soil, containing pesticides and inorganic contaminants at levels exceeding ecological RC. These specific levels will be determined via site-specific toxicity tests during the remedial design (RD) phase.

- Protection of groundwater from migration of arsenic and dieldrin from soil.

A detailed analysis of the possible remedial alternatives for Site 17 is included in the Site 17 FFS report. The detailed analysis was conducted in accordance with the EPA document entitled “Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA” (EPA, 1988) and the National Oil and Hazardous Substances Contingency Plan (NCP).

All of the alternatives (except No Action) include removal of aboveground structures (buildings and concrete pads) as well as underground structures (holding tank and dry well along with associated piping), followed by on-site decontamination (by pressure washing) of metal for salvage, as appropriate, or direct disposal at an approved rubble landfill. Decontamination waste water is assumed to require disposal at a



NO	DATE	REVISIONS	BY	CHKD	APPD	REFERENCES

DRAWN BY DLT DATE 5/4/98
CHECKED BY DATE 07/31/98
COST/SCHED-AREA
SCALE AS NOTED

Brown & Root Environmental

ESTIMATED AREA OF SOIL CONTAMINATION EXCEEDING PRGs
PESTICIDE SHOP (SITE 17)
NAS PATUXENT RIVER
MARYLAND

CONTRACT NO 7194
OWNER NO 0259
APPROVED BY
DATE 7-30-98
APPROVED BY
DATE
DRAWING NO FIGURE 2-4
REV 0

Treatment/Storage/Disposal (TSD) facility off site. Any vadose zone soil (associated with the excavation of underground structures) that is contaminated at levels exceeding groundwater RC will also be excavated and treated/disposed of at a RCRA TSD facility off site.

All of the conceptual design calculations for the alternatives are presented in Appendix C of the FFS (TtNUS, 1998). Details of the cost estimates of the alternatives are presented in Appendix D of the FFS. A summary of the remedial alternatives, which were, developed to address contamination associated with Site 17 soil is presented below.

2.6.1 Alternative 1 - No Action

Description: Under this alternative no further effort or resources would be expended at Site 17. Alternative 1 serves as the baseline against which the effectiveness of the other alternatives is judged.

Costs: There would be no costs associated with this alternative.

2.6.2 Alternative 2: Impermeable Capping and Institutional Controls

Description: This alternative combines containment and institutional controls. Accordingly, the two components are: (1) capping to serve as a barrier to potential receptors and to minimize infiltration and the consequent migration of contaminants; and (2) institutional controls.

Institutional controls would consist of access restrictions to prevent trespassing, recording of contamination in the Base Master Plan including prohibition of excavation on site, land use restrictions to control site development and residential development, including access to groundwater, and monitoring to assess migration of contaminants in the environment. Potential contaminants from soil that could migrate into groundwater are dieldrin and arsenic. Monitoring would consist of periodic sampling of groundwater from 6 wells (onsite and downgradient of the site) and analysis for dieldrin and arsenic. Inspection and maintenance of the cap would be required.

Under this alternative the area of contaminated soil containing COCs at levels that may exceed site-specific ecological cleanup levels (to be determined at the time of remedial design/action phase) would be covered by a cap containing an impermeable layer. Approximately 51,000 square feet is conservatively assumed to be the maximum extent of area that would be covered by this cap. This area would also include those areas that are contaminated at levels exceeding human health and groundwater protection RC. Components of the cap would consist of the following (from the bottom layer in ascending order):

1. Containment (impermeable) layer (such as Geo-composite Clay layer - GCL/High-Density Polyethylene - HDPE)
2. Drainage layer (12 inches of coarse sand)
3. Separation layer (such as Geotextile)
4. Root-penetration/frost protection layer (18 inches of compacted clean soil)
5. Top soil layer (6 inches in thickness)
6. Vegetation

The approximate total thickness of the cap would be 3 feet.

At the time of remedial design, additional components to the cap such as a biotic barrier may be considered if soil burrowing animals are expected to enter the site from surrounding areas. The biotic barrier would be placed under the root-penetration/frost protection layer.

Demolition of aboveground structures and excavation of underground structures as described in the introduction to Section 2.6, and site preparation (weed removal, grubbing, grading, etc.) would be required prior to installation of the cap. The slope of the cap would be graded to permit even drainage of surface water. The actual dimensions of the cap would be defined at the time of remedial design, with additional soil sampling, as required.

Cost

Capital: $570,000
O&M: $16,500/yr
Present worth: $808,000(estimated over 30 years)

This alternative is expected to take 4 months to implement. For purposes of estimating and comparing the costs of the alternatives, monitoring of groundwater and maintenance of the cap are assumed to continue for 30 years.

2.6.3 Alternative 3: In-Situ Chemical Fixation/Solidification With Institutional Controls

Description: In this alternative, the contaminated soil containing COCs at levels that may exceed site-specific ecological cleanup levels (to be determined during the remedial design/action phase) would be treated in-situ or in place without excavation. This area of contaminated soil would also include contaminant levels that exceed human health and groundwater protection RC. It is conservatively presumed that soil down to a depth of an average of 2 feet bgs would be treated over an area of approximately 51,000 square feet, or approximately 3,800 cubic yards in volume. The institutional controls component of this alternative would consist of access restrictions to prevent trespassing, land use restrictions to prevent residential development, and monitoring to assess the migration of contaminants in the environment. Monitoring would consist of annual groundwater sampling (6 samples) and analysis of all samples for dieldrin and arsenic.

The first phase of the remedial action would consist of demolition of aboveground structures and excavation of underground structures as described in the introduction to Section 2.6. In the next phase, treatment would consist of mixing fixating/solidifying agents into the soil using mechanisms such as augers, rakes, etc. Based on the results of a treatability study (B&R Environmental, 1997), cement kiln dust (CKD) would adequately solidify the soil and minimize mobility of pesticides. The ratio of soil to cement kiln dust by weight was determined to be approximately 10:1. However, pesticides would not be chemically treated and only their physical entrapment can be achieved, therefore the long-term leachability (i.e., the ability to migrate in the environment by dissolving in rain water) of pesticides is questionable. Approximately 500 tons of cement kiln dust is estimated to be required for the process.

Following mixing, the soil would be allowed to cure over a period of a few weeks. When field observations indicate that curing is nearing completion, a soil cover with vegetative erosion control would be placed on the surface of the treated soil.

Costs: The costs for this alternative are estimated to be as follows.

Capital cost: $620,000
Operating and Maintenance: $16,500/yr
Present-worth: $860,000 (estimated over 30 years)

This alternative is expected to take 3 months to implement. For purposes of estimating and comparing the cost of the alternative, the monitoring of groundwater and maintenance of the soil cover is assumed to continue for 30 years.

2.6.4 Alternative 4: Excavation and Off-Site Treatment/Disposal

Description: This alternative consists of excavation of the soil contaminated at levels that may exceed site-specific ecological cleanup levels (to be determined during remedial design/action phase), followed by a treatment or a disposal option. This soil would also include areas where contaminant levels exceed human health and groundwater protection RC. Alternative 4A (off-site incineration of the soil followed by landfilling of the ash) or Alternative 4B (direct landfilling of the soil) would both require the use of a RCRA Treatment/Storage/Disposal (TSD) Facility. Clean soil would be backfilled in the excavated area. Both options would include demolition of above ground structures and excavation of underground structures as described in the introduction of Section 2.6.

2.6.4.1 Alternative 4A

Under Alternative 4A, approximately 3,800 cubic yards of soil (over an area of 51,000 square feet and average depth of 2 feet bgs), corresponding to a mass of approximately 5,100 tons is conservatively assumed to require excavation. The excavated soil would be transported in 20 cubic yard rolloff boxes to an incineration facility certified with a RCRA Part B permit. Following incineration, the ashes would be treated by chemical fixation/solidification, if required for metals, and disposed of in a RCRA landfill because of the RCRA-listed nature of the waste.

Costs: The costs for this alternative are estimated to be as follows.

Capital cost: $4,530,000
Operating and Maintenance: $0/yr
Present-worth: $4,530,000

This alternative is expected to take 6 months to implement. There is no monitoring of groundwater and maintenance of the soil cover associated with this alternative.

2.6.4.2 Alternative 4B

Under Alternative 4B, the same volume of soil (as described under Alternative 4A) would be excavated and transported for direct landfilling at a RCRA Subtitle C facility. Alternative 4B is dependent on obtaining a waiver of the Land Disposal Restriction (LDR) standards that are applicable to the soil because of the presence of constituents that carry a RCRA listing. This waiver would be obtained from the EPA and must be accepted by the State where the RCRA landfill is located and by the disposal facility.

Costs: The costs for this alternative are estimated to be as follows.

Capital cost: $1,400,000
Operating and Maintenance: $0/yr
Present-worth: $1,400,000

This alternative is expected to take 6 months to implement. There is no monitoring of groundwater and maintenance of the soil cover with this alternative.

2.6.5 Alternative 5: Excavation, On-Site Thermal Desorption, And Backfilling Of Treated Soil

Description: In this alternative, the contaminated soil containing COCs at levels that may exceed site-specific ecological cleanup levels (to be determined during remedial design/action phase) would be excavated, treated on site and the treated soil backfilled in the excavated area. This soil would also include areas where contaminant levels exceed human health and groundwater protection RC. It is conservatively assumed that approximately 3,800 cubic yards of soil (over an area of 51,000 square feet and average depth of 2 feet bgs) corresponding to a mass of approximately 5,100 tons would be excavated and fed to a thermal desorption system. The remedial action would include demolition of aboveground structures and excavation of underground structures as described in the introduction to Section 2.6.

The thermal desorption system would heat the soil through direct contact with hot, forced air or indirectly using hot oil or molten salt. The temperature of treatment required for achieving pesticide removal efficiencies exceeding 99 percent is estimated to be approximately 1000 ºF, based on treatability study results (Eli Eco Logic International, Inc., 1997). The estimated processing rate of soil is approximately 100 to 125 tons per day. The volatilized pesticides would be conveyed to an off-gas treatment (air emissions control) system, which can vary from quenching/scrubbing/activated carbon adsorption, condensation, or reductive hydrogenation. The most commonly used off-gas treatment units consist of the quenching/scrubbing/activated carbon adsorption system. In such systems, filtration and activated carbon adsorption is used for treatment of wastewater from the off-gas quenching/scrubbing process. It is expected that off-gas treatment using reductive hydrogen treatment would not be selected because of relatively higher costs. Residues from the off-gas treatment and wastewater treatment would be disposed of by incineration off site.

The soil would be treated to meet ecological and groundwater protection RC and LDR standards for pesticides. The treated soil would also meet human health RC. Any areas of soil containing levels of arsenic and lead exceeding RC would be excavated and disposed of at RCRA TSD facility off site. Following treatment, the soil would be stockpiled temporarily, cooled with water and backfilled.

Costs: The costs for this alternative are estimated to be as follows.

Capital Cost: $2,250,000
Operating and Maintenance: $0/yr
Present-worth: $2,250,000

This alternative is expected to take 4 months to implement. There would be no long-term monitoring activities.

2.6.6 Alternative 6: Excavation Of Soil, Off-Site/On-Site Treatment, Backfilling/Disposal; and Soil/Gravel Cover Over Entire Site

This alternative addresses the treatment of soil areas where contaminant levels exceed human health and groundwater protection RC. Excavation and offsite treatment/disposal or onsite treatment would address the contaminated soil. The alternative also includes placement of a soil and gravel cover over the remaining area of the site, where soil is contained at levels that may exceed site-specific ecological cleanup levels to be determined during the remedial design/action phase. The remaining area of the site would be addressed by the use of a soil and gravel cover to minimize exposure of potential ecological receptors to the residual contaminants. The site, conservatively assumed to cover an area up to approximately 51,000 square feet, would be covered with a gravel layer followed by a layer of clean soil. The disposal/treatment options would be: offsite hazardous waste landfilling (assuming a waiver of LDRs can be obtained), offsite incineration at a RCRA TSD facility and onsite thermal desorption.

Based on combinations of soil treatment and disposal, four options are being considered:

- Alternative 6A: Excavation and Off-site RCRA Landfilling; Regrading; and Soil/Gravel Cover.
- Alternative 6B: Excavation and Off-site RCRA TSD Facility Incineration; Regrading; and Soil/Gravel Cover.
- Alternative 6C: Excavation, On-site Thermal Desorption, and Backfilling of Treated Soil; and Soil/Gravel Cover.
- Alternative 6D: Excavation, On-site Thermal Desorption, and Off-site RCRA Landfilling of Treated Soil; Regrading; and Soil/Gravel Cover.

In each of the options listed above, soil with contaminant levels exceeding RC for human health and groundwater protection, would be excavated. Approximately 13,000 square feet of soil would be excavated down to a depth of an average of 2.0 feet below ground surface (bgs). Approximately 1000 cubic yards of soil (or approximately 1,350 tons) would be excavated. Each of the options would include demolition of aboveground structures and excavation of underground structures as described in the introduction to Section 2.6.

2.6.6.1 Alternative 6A

Under Alternative 6A, the excavated soil (approximately 1,350 tons) would be transported off site and disposed of at a RCRA-certified hazardous waste landfill. The implementation of this alternative assumes that a waiver of LDRs can be obtained in a timely manner. Then the entire area of the site (those areas where contaminant levels exceed ecological RC, would be regraded and covered with a soil and gravel cover of two-foot thickness. The soil and gravel cover components would be as listed below (in ascending order):

1. Geotextile layer (approximately 51,000 square feet)
2. Gravel layer (approximately 12 inches in thickness)
3. Common fill layer (uniform thickness of 6 inches, compacted volume of approximately 950 cubic yards)
4. Top soil (uniform thickness of 6 inches, approximately 950 cubic yards volume)
5. 5. Vegetation

Cap maintenance and monitoring of the cap integrity and additional ecological tests (as required) to verify the cap efficiency, will also be included.

2.6.6.2 Alternative 6B

Under Alternative 6B, the excavated soil would be transported off site and treated by incineration and the ashes landfilled at a RCRA-certified TSD facility. The site would be regraded and a soil and gravel cover would be placed over the entire site, as described under Alternative 6A. Cap maintenance/monitoring would be included, also as described under Alternative 6A.

2.6.6.3 Alternative 6C

Under Alternative 6C, the excavated soil would be treated on site by thermal desorption (with air emissions control) until human-health RC, groundwater protection RC and LDRs are met, then the treated soil would be backfilled. The site would be regraded and a soil and gravel cover would be placed over the site, as described above. Cap maintenance/monitoring would be included, also as described under Alternative 6A.

2.6.6.4 Alternative 6D

Under Alternative 6D, the excavated soil would be treated on site by thermal desorption (with air emissions control) until LDRs are met and disposed of off site at a RCRA-certified hazardous waste landfill. The site would be regraded and a soil and gravel cover would be placed over the entire area of the site, as described above. Cap maintenance/monitoring would be included, also as described under Alternative 6A.

In each of the options of this alternative, the placement of the clean soil and gravel cover would provide a barrier to potential ecological receptors. The necessity for and extent of this soil/gravel cover would be determined at the time of remedial action based on results from a site-specific toxicity study. The Navy would also institute records in the Base Master Plan regarding the contamination and prohibition of intrusive activities.

Costs: The estimated capital, O&M and present-worth costs of this alternative are as presented below:

	Capital($)	O&M ($/yr)	Present-worth ($)
Alternative 6A	837,000	6,000	906,000
Alternative 6B	1,750,000	6,000	1,820,000
Alternative 6C	1,790,000	6,000	1,862,000
Alternative 6D	2,080,000	6,000	2,150,000

Alternatives 6A and 6B would each take approximately 3 months to implement and Alternatives 6C and 6D would each take approximately 4 months to implement. Long-term cap maintenance would be required under each suboption. For purposes of estimating and comparing the cost of the alternatives, cap maintenance is assumed to continue for 30 years.

2.6.7 Summary

Table 2-9 presents a summary of the salient features of each alternative.

2.7 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

The remedial alternatives presented in Section 2.6 were evaluated in the Final Draft FFS against nine criteria identified in the NCP. The comparison of each alternative to the nine criteria is presented below. A summary of the comparative analysis is presented in Table 2-10.

2.7.1 Threshold Criteria

Overall Protection of Human Health the Environment

Alternatives 4, 5 and 6 would offer a high level of protection of human health and the environment because these alternatives would either remove or treat a majority of the contamination at the site. Alternative 4A and 5 would be most protective because they would employ treatment of all the contaminated soil in order to attain RC. Alternative 6 would also be protective because it would remove or treat the portion of the soil posing the principal potential threat to human receptors, although it would employ a non-treatment method (i.e., a barrier) to address the protection of ecological receptors, if necessary. Alternative 6B, 6C and 6D would be more protective than 6A and 4B because the latter

TABLE 2-9

SUMMARY OF SALIENT FEATURES OF ALTERNATIVES
OPERABLE UNIT 1, SOIL
SITE 17 - PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

Alternatives	Main Components	Applicable Standards	Cost present-worth $
-1. No Action	None	Does not meet RC	None
2. Impermeable Capping	-Cap all soils > ecological RC -Institutional controls -Monitoring	- Provides barrier to potential receptors -Minimizes migration of contaminants	808,000
3. In-situ Chemical Fixation/Solidification	-In-situ treatment of all soils> ecological RC -Institutional controls -Monitoring	-Prevents potential receptors from risk of exposure -Reduces mobility of contaminants -LDRs not applicable	860,000
4A. Excavation (3,800 cy)/ RCRA Incineration	-Excavate all soils>ecological RC – Offsite RCRA incineration (5,100 ton) – Backfill clean soil	-Meets all RC -Meets LDRs	4,530,000
4B. Excavation (3,800 cy)/ RCRA Landfilling	-Excavate all soils> ecological RC – Offsite RCRA landfilling (5,100 ton Backfill clean soil	-Meets all RC -Requires LDR waiver	1,400,000
5. Excavation (3,800 cy)/ Thermal Desorption	-Excavate and treat all soils> ecological RC –Treatment (5,100 ton) –Onsite backfill of treated soil	-Meets all RC -Meets LDRs	2,250,000
6A. Soil Excavation (1,000 cy)/RCRA Landfilling	-Excavate all soils> human health RC – Offsite RCRA Landfilling (1,350 ton) –Backfill clean soil	-Meets human health and groundwater protection RC -Provides a barrier to ecological receptors -Must obtain waiver of LDRs	906,000
6B. Soil Excavation (1,000 cy)/RCRA Incineration	-Excavate all soils> human health RC –Offsite RCRA Incineration (1,350 ton) –Backfill clean soil	-Meets human health and groundwater protection RC -Provides a barrier to ecological receptors –Meets LDRs	1,820,000
6C. Soil Excavation (1,000 cy)/RCRA Thermal Desorption Backfilling	-Excavate all soils> human health RC –Onsite treatment (1,350 ton) –Backfill treated soil	-Meets human health and groundwater protection RC -Provides a barrier to ecological receptors	1,860,000
6D. Soil Excavation (1,000 cy)/Thermal Desorption/RCRA Landfilling	-Excavate all soils> human health RC –Onsite treatment (1,350 ton) –Offsite RCRA Landfilling –Backfill clean soil	-Meets human health and groundwater protection RC -Provides a barrier to ecological receptors –Meets LDRs	2,150,000

TABLE 2-10

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
OPERABLE UNIT 1, SOIL
SITE 17 - PESTICIDE SHOP
NAS PATUXENT, MARYLAND
PAGE 1 OF 2

Alternative	Overall Protection of Human Health and Environmental	Compliance with ARARs and TBCs	Long-Term Effectiveness and performance	Reduction of Toxicity, Mobility and Volume through treatment	Implementability	Short-term Effectiveness (Remedial action duration)	Cost (Present Worth $)	State and Community Acceptance
1. No Action	Not Protective	Does Not Comply	Not effective or permanent	None	Readily implementable	No Concerns	0	To Be Determined
2. Impemeable Capping	Protective	Complies	Depends on maintenance & Monitoring	None	Easily implementable	Minimal Concerns (4 months)	808,000	To Be Determined
3. In-Situ Chemical Fixation/Solidification	Protective	Complies	Depends on Monitoring	Reduction of Mobility	Uniformity of treatment	Minimal Concerns (3 months)	860,000	To Be Determined
4A. Excavation (3,800 cy)/RCA Incineration	Protective	Complies	Effective and permanent	Reduction of Toxicity	Easily implementable	Exposure to workers can be controlled (6 months)	4,530,000	To Be Determined
4B. Excavation (3,800 cy)/RCRA Landfilling	Protective	LDR Waiver required	Effective and permanent	None	Easily implementable	Exposure to workers can be controlled (6 months)	1,400,000	To Be Determined
5. Excavation (3,800 cy)/ Thermal Description	Protective	Complies	Effective and permanent	Reduction of Toxicity	Determination of operating parameters	Exposure to workers can be controlled (5 months)	2,250,000	To Be Determined
6A. Soil Excavation (1,000 cy)/RCRA Landfilling	Protective	LDR Waiver required	Effective with minimal maintenance	None	Human health delineation	Exposure to workers can be controlled (3 months)	906,000	To Be Determined
6B. Soil Excavation (1,000 cy)/RCRA Incineration	Protective	Complies	Effective with minimal maintenance	Reduction of human health toxicity	Human health delineation	Exposure of workers can be controlled (3months)	1,820,000	To Be Determined

TABLE 2-10

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES
OPERABLE UNIT 1, SOIL
SITE 17 - PESTICIDE SHOP
NAS PATUXENT RIVER, MARYLAND

Alternative	Overall Protection of Human Health and Environmental	Compliance with ARARs and TBCs	Long-Term Effectiveness and performance	Reduction of Toxicity, Mobility and Volume through treatment	Implementability	Short-term Effectiveness (Remedial action duration)	Cost (Present Worth $)	State and Community Acceptance
6C. Soil Excavation Desorption/ Backfilling	Protective	Complies	Effective with minimal maintenance	Reduction of human health toxicity	Human health delineation & determination of operating parameters	Exposure tp workers can be controlled (4 months)	1,860,000	To Be Determined
6D. Hotspot Excavation (1,000 cy)/ Thermal Desorption/ RCRA Landfilling	Protective	Complies	Effective with minimal maintenance	Reduction of human health toxicity	Human health delineation & determination of operating parameters	Exposure to workers can be controlled (4 months)	2,150,000	To Be Determined

Notes:

1	Alternative 1:	No Action
2	Alternative 2:	Impermeable Capping and Institutional Controls
3	Alternative 3:	In-Situ Chemical Fixation/Solidification and Institutional Controls
4(A)	Alternative 4A:	Excavation, Off-site RCRA Incineration
4(B)	Alternative 4B:	Excavation, Off-site RCRA Landfilling
5	Alternative 5:	Excavation, On-site Thermal Desorption, and Backfilling of Treated Soil
6(A)	Alternative 6A:	Excavation of Soil, and Off-site RCRA Landfilling; Regrading, and over entire site.
6(B)	Alternative 68:	Excavation of Soil and Off-site RCRA TSDF Incineration; Regrading, and Soil/Gravel over entire site.
6(C)	Alternative 6C:	Excavation of Soil, On-site Thermal Desorption, and Backfilling of Treated Soil; and Soil/Gravel over entire site.
6(D)	Alternative 6D:	Excavation of Soil, On-site Thermal Desorption, and Off-site RCRA Landfilling of Treated Soil; Regrading, and Soil/Gravel Cover over entire site.

alternatives do not employ any treatment. Alternatives 2 and 3, on the other hand, would be somewhat less protective because they would be the most dependent on institutional controls to prevent exposure to contaminants and monitoring to verify minimization of migration of contaminants into the environment.

Although Alternative 4B does not employ any treatment, it addresses the removal of all the contaminated soil followed by off site disposal at a secure landfill, which could also be protective. Alternative 1 would not be protective of human health or the environment. Since Alternative I does not meet the threshold criteria of protecting human health and the environment, it is eliminated from consideration and will not be discussed further.

Compliance with ARARs and TBCs

Alternatives 2, 3,4, 5 and 6 would comply with Applicable or Relevant and Appropriate Requirements and TBCs except that Alternatives 4B and 6A would require a waiver of the LDR standards from the EPA and acceptance by the destination State and TSD facility for direct landfilling.

2.7.2 Primary Balancing Criteria

Long-Term Effectiveness and Permanence

Alternatives 4A and 5 would be most effective in the long term because of treatment of pesticides by desorption/destruction. Alternative 6 would also be effective assuming that the soil and gravel cover outside of the excavated area would be maintained in the long term. Alternatives 613, 6C and 6D (all of which employ treatment), would be more effective than Alternatives 6A and 4B because the latter alternatives are more dependent on the reliability of an off site landfill. Alternatives 2 and 3 would be less effective in the long term because the contaminants would remain on site and not be destroyed, and consequently, these alternatives would be most dependent on institutional controls and monitoring in the long term. However, the long-term effectiveness of Alternatives 2 or 3 can be monitored and corrective measures may be taken as necessary.

Reduction of Toxicity, Mobility and Volume Through Treatment

Alternatives 4A, 5, 6B, 6C and 6D offer the greatest reduction in toxicity through treatment by incineration or thermal desorption. Alternatives 4A and 5 would treat approximately 5,100 tons of soil containing pesticides (mainly DDTR) at an average concentration of approximately 200 mg/kg. Alternatives 6B, 6C and 6D would treat approximately 80 percent of the mass of contaminants treated under Alternative 4A and 5, but within only approximately 30 percent of the mass of contaminated soil. Alternative 3 would reduce the mobility of contaminants through chemical fixation/solidification. Alternatives 2, 4B and 6A would not employ any treatment.

Implementability

Alternatives involving offsite disposal/treatment (4A, 4B, 6A and 6B) are easier to implement than the other alternatives. Among these alternatives, Alternative 4A is the easiest to implement because, unlike Alternative 6B, no delineation of soils exceeded Human Health and Ecological RC would be required. Alternative 6B would be easier to implement than Alternatives 4B and 6A, because these latter alternatives require LDR waivers, which may not be easy to obtain. Alternative 6A would be harder to implement than Alternative 4B because, in addition to a LDR waiver, onsite soil contaminant delineation would be required. Alternatives involving onsite thermal desorption (5, 6C and 6D) may be difficult to effectively implement since low levels of certain contaminants (i.e. heptachlor) may be difficult to treat to the established RC. Alternatives 2 and 3 involving onsite capping and in-situ fixation and solidification are easy to implement, but they are more dependent on long-term responsibilities of monitoring and maintenance which is an additional implementability burden.

Short-term Effectiveness

Alternatives 2, 3, 4, 5 and 6 would be effective in the short term. Any exposures to workers or the community due to contaminants in the soil can be adequately controlled. Remedial action durations for Alternative 6 would be approximately 3 to 4 months. Remedial action duration for Alternative 2 would be approximately 4 months. Remedial action durations for Alternatives 3, 4 and 5 would be approximately 3, 6 and 5 months respectively. Short-term effectiveness concerns are not relevant for Alternative 1 because no actions would be undertaken.

Cost

The present-worth costs of the alternatives would be as follows:

Alternative 2:	$808,000
Alternative 3:	$860,000
Alternative 4A:	$4,530,000
Alternative 4B:	$1,400,000
Alternative 5:	$2,250,000
Alternative 6A:	$906,000
Alternative 6B:	$1,820,000
Alternative 6C:	$1,860,000
Alternative 6D:	$2,150,000

2.7.3 Modifying Criteria

State Acceptance (to be modified)

The state concurs with the selected remedy. A letter of concurrence from MDE is presented in Appendix A.

Community Acceptance (to be modified)

The preferred alternative and other alternatives considered in the FS for this site were presented to the public on September 29, 1998. Comments obtained during the public meeting and the 30-day comment period are presented in the transcripts (Appendix B) and responsiveness summary (Appendix C).

2.8 THE SELECTED REMEDY

The selected remedy for Site 17 is Alternative 6B: Excavation of Soil to Human Health Risk Levels, Offsite RCRA Incineration; Regrading; and Installation of a Gravel Layer and Soil Cover Over Site; and Institutional Controls limiting intrusive activities to maintain the integrity of the cover. Based on available information and a current understanding of site conditions, the Navy believes that Alternative

6B offers the best balance of the nine NCP criteria. Also, the selected alternative meets the statutory requirements for Protection of Human Health and the Environment, Compliance with ARARs, Cost Effectiveness, Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable, and Preference for Treatment as a Principal Element.

The major components of the selected remedy involve the following. The Navy shall demolish all above ground and excavate underground structures (as detailed in the introduction to Section 2.6); excavate soil containing contaminants exceeding human-health and groundwater protection RC followed by off-site incineration; regrade the site; and place a soil and gravel cover if required to meet site-specific ecological cleanup levels. At the time of excavation of underground structures, the vadose zone soil immediately surrounding these structures shall be tested to determine if contaminant levels exceed groundwater protection RC, and if so, then the Navy shall also remove this soil. The areas where COCs exceed human health RC and the assumed maximum areas to be capped are shown in Figure 2-4.

2.8.1 Performance Standards of Preferred Remedy

Soil Removal, Treatment, and Disposal

The Navy shall excavate soils containing concentrations of contaminants that are greater than the human-health and groundwater protection remediation criteria (RC) listed on Table 2-11 of this ROD. The Navy estimates that it will excavate approximately 1,000 cubic yards of soil (approximately 1,350 tons). This excavation is estimated to cover an area of 13,000 square feet to an average depth of 2 feet below ground surface. The Navy shall also excavate what is expected to be a relatively smaller volume of deeper vadose zone soil along with the underground structures in order to attain groundwater protection RC. The Navy shall then transport the excavated soil off site for disposal in a RCRA certified TSD facility that employs incineration. The pesticides in the soil shall be incinerated to attain LDR standards and the ashes shall be disposed of at a RCRA-certified landfill. The Navy shall perform a toxicity study to determine whether there is a potential risk to ecological receptors due to residual contaminants following soil removal. The results of the toxicity study will indicate whether ecological receptors have been adequately protected from residual contaminants to which they may be exposed via the food chain or direct contact.

Soil and Gravel Cover

If the site-specific toxicity study indicates that ecological receptors must be protected from the residual soil contaminants, then a clean up level will be determined at that time. It is estimated that following soil removal, the Navy may need to regrade a maximum area of approximately 51,000 square feet and place a soil and gravel cover as a barrier between potential ecological receptors and residual contaminants. The gravel and soil cover will consist of the following components:

1. Geotextile layer (approximately 51,000 square feet) to separate the clean cover from the underlying contaminated soil.

2. Gravel layer (approximately 12 inches thick).

3. Common fill layer (uniform thickness of 6 inches, compacted volume of approximately 950 cubic yards).

4. Top soil (uniform thickness of 6 inches, approximately 950 cubic yards volume) with vegetation.

Cap Maintenance

Following the soil removal and the gravel soil cover placement, the Navy shall maintain the cap over an indefinite period of time. Maintenance shall consist of ensuring that surface drainage channels are maintained, vegetation is preserved and erosion of the cover is minimized. Periodic testing of the efficacy of the cover in protecting ecological receptors will be conducted, as necessary.

Institutional Controls

The Navy shall prohibit activities that interfere with or compromise the integrity of the soil cover at the Site 17, This is the “land use control objective” for Site 17.

Within 90 days of receipt of the EPA acceptance letter of the draft final (or final) site-specific soil toxicity testing report, the Navy shall develop a Land Use Control Implementation Plan (LUCIP) for NAS Patuxent River with the concurrence of EPA Region III and in consultation with the State of Maryland. The LUCIP shall include:

(1) A description and the location of Site 17, including a map, a description of its approximate size and a description of the COCs detected at Site 17;

(2) The land use control objective (LUC) selected above;

(3) The particular controls and mechanisms to achieve these goals;

(4) A reference to this ROD; and

(5) Any other pertinent information.

Within 180 days following the execution of this ROD, the Navy, with the concurrence of EPA Region III and in consultation with the State of Maryland, shall develop a Land Use Control Assurance Plan (LUCAP) for NAS Patuxent River. The LUCAP shall contain Station-wide periodic inspection, condition certification and agency notification procedures designed to ensure the maintenance by Station personnel of any site specific LACS deemed necessary for future protection of human health and the environment, including the LUC selected in this ROD. A fundamental premise underlying execution of the LUCAP is that through the Navy's substantial good-faith compliance with procedures called for therein, reasonable assurances will be provided to USEPA and the State of Maryland as to the permanency of those remedies which include the use of specific LACS.

Although the terms and conditions of the LUCAP will not be specifically incorporated or made enforceable as to this or any other ROD, it is understood and agreed by the Navy, USEPA and the State of Maryland that the contemplated permanence of the remedy reflected herein shall be dependent upon the Station0s good-faith compliance with specific LUC maintenance commitments reflected herein. Should such compliance not occur or should the LUCAP be terminated it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

2.9 STATUTORY DETERMINATIONS

Remedial actions must meet the statutory requirements of Section 121 of CERCLA as discussed below. Remedial actions undertaken at NPL sites must achieve adequate protection of human health and the environment, comply with applicable or relevant and appropriate requirements of both Federal and state laws and regulations, be cost effective, and utilize, to the maximum extent practicable, permanent solutions and alternative treatment or resource recovery technologies. Also, remedial alternatives that reduce the volume, toxicity, and/or mobility of hazardous waste as the principal element are preferred. The following discussion summarizes the statutory requirements that are met by the selected remedy.

2.9.1 Protection of Human Health and the Environment

The preferred remedy will protect human health and the environment. The removal of the contaminated soil hotspots for incineration at a RCRA-certified TSD facility will ensure that the principal threat (to human health) is removed and treated. The installation of a soil and gravel cover over the area of soil contaminated at levels exceeding ecological RC levels will protect ecological receptors from exposure to contaminants by eliminating the pathway of exposure. Short-term risks resulting from exposure to contaminated soil during excavation, transportation, or disposal can be adequately controlled by the use of proper personal protective equipment and safe work practices.

2.9.2 Compliance with ARARs

The preferred remedy will be implemented to meet all applicable or relevant and appropriate requirements, as listed in Appendix C. The excavated soil will be treated by incineration to meet Land Disposal Restrictions. Land Disposal Restriction Standards that currently apply are summarized in Table 2-11. According to these standards, to allow land disposal of soil classified as hazardous, a 90 percent reduction in the concentrations of the hazardous constituents of that soil must be demonstrated. This reduction must be evidenced with respect to either total concentrations for organics or TCLP leachate levels for inorganics. However, the 90 percent reduction is not required provided that the chemical-specific lower LDR limit has been achieved.

A RCRA-certified TSD facility will be employed for incineration of the soil containing COCs that are present at levels greater than human health risk-based RC. The ashes from incineration will carry the RCRA listing of the soil, and therefore would require disposal at a RCRA-certified landfill. Table 2-11 provides the human health and groundwater protection RC that will be met by removal of the hotspots. On site, the use of a soil and gravel cover in conjunction with maintenance will ensure that ecological receptors will not be exposed to soil containing COCs in excess of site-specific ecological cleanup levels that will be determined at the time of remedial design/action. Construction and maintenance of the cover will be in accordance with the State of Maryland regulations related to erosion and sediment controls (COMAR 26.17.01) and storm water management (COMAR 26.17.02).

Figure 2-5
Percentage DDTR Removed/Treated and Corresponding Volumes of Contaminated Soil, Site 17
Pesticide Shop
NAS Patuxent River, Maryland

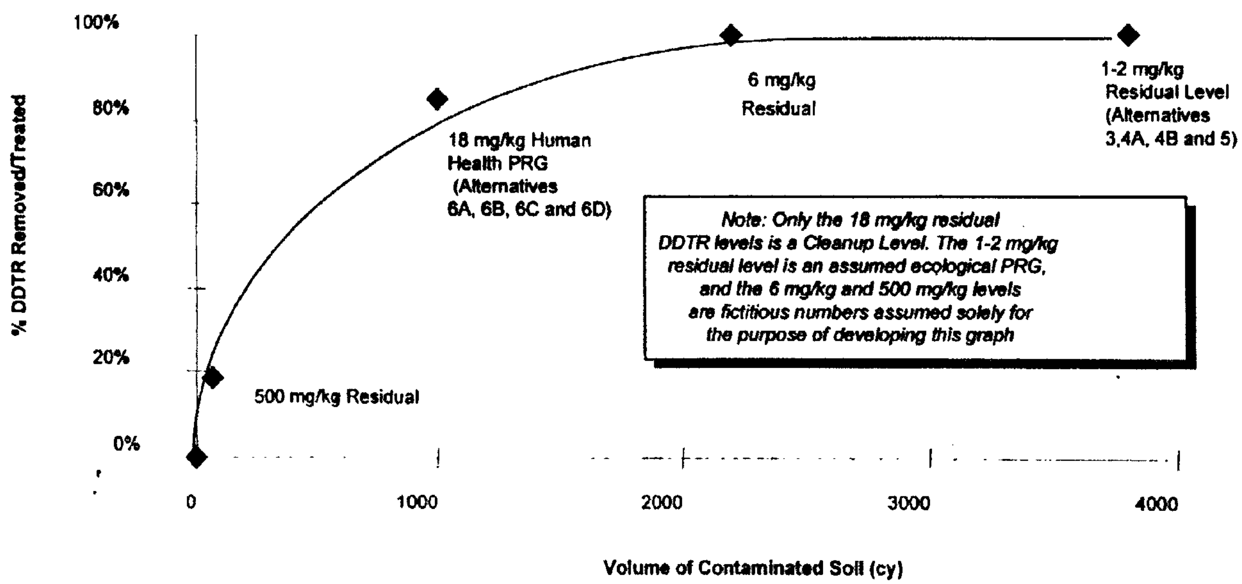
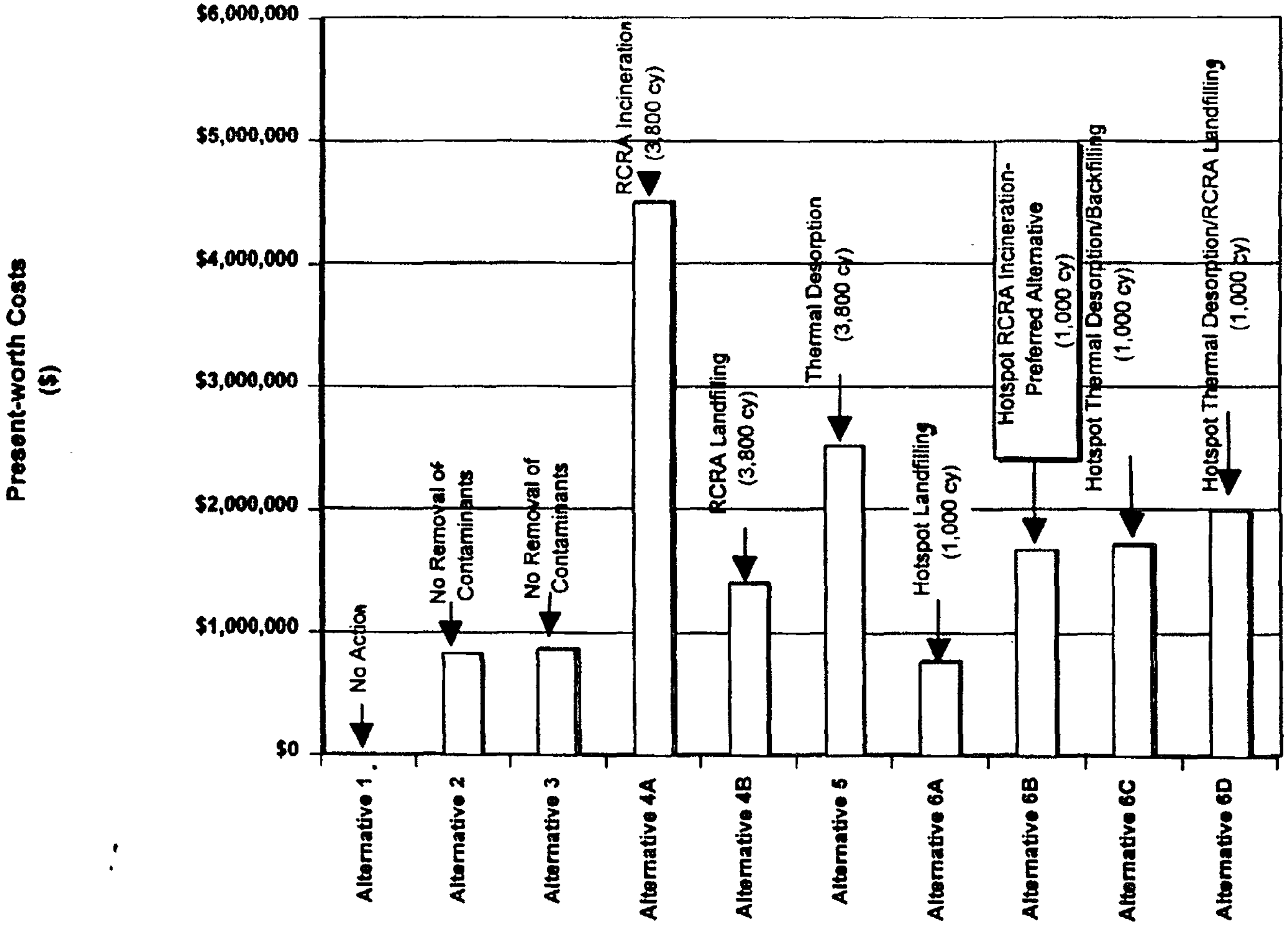


Figure 2-6
Comparison of Costs for Soil Volumes Removed/Treated under each Alternative, Operable Unit 1 Soil, Site 17-Pesticide Shop, NAS Patuxent River, Maryland



2.9. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

Alternative 6 addresses a majority of contaminants within a relatively smaller volume of soil compared to the volume excavated under Alternatives 4A, 4B and 5. Among the suboptions of Alternative 6, Alternative 6B cost effectively employs treatment with relatively lesser implementability concerns than Alternatives 6C or 6D, and does not depend on obtaining an LDR waiver as does Alternative 6A. The preferred remedy (Alternative 6B) addresses the portion of soil that poses the principal threat by excavating and incinerating it in a RCRA-certified TSD facility. The preferred remedy employs a soil and gravel cover over the remainder of the site as a barrier to potential ecological receptors, thereby limiting the volume of soil excavated from the site. Therefore, the preferred remedy utilizes permanent solutions and resource recovery to the maximum extent practicable. The preferred remedy (Alternative 6B) also provides the best balance of trade-offs among the alternatives with regard to: long-term effectiveness and permanence; reduction in toxicity, mobility or volume through treatment; short-term effectiveness; implementability, and cost.

2.9.5 Preference for Treatment as a Principal Element

The preferred remedy utilizes treatment as a principal element to address the principal concern at this site. The principal concern at this site is the potential threat of direct human exposure to pesticides in the soil.

3.0 RESPONSIVENESS SUMMARY

The Responsiveness Summary is a concise and complete summary of significant comments and responses/resolution of these comments received from the public. The Responsiveness Summary provides the lead agency with information on the views of the community. It also documents how the lead agency has considered public comments during the decision-making process and provides answers to major comments. This Responsiveness Summary was prepared after the public comment period (which ended on October 29, 1998) in accordance with guidance in "Community Relations in Superfund: A Handbook" (OSWER Directive 9230.0-3B, January 1992).

3.1 OVERVIEW

The Proposed Remedial Action Plan as presented to the public identified the preferred remedy for Site 17, Pesticide Shop, Soil Operable Unit, as follows: "Excavation of soil that poses a risk to human health; Off-site RCRA Incineration; Regrading; and Soil/Rip-rap Cover Over the Entire Site". The cover component was included to address the protection of potential ecological receptors. Subsequently, the EPA and Navy modified the cover component of the preferred remedy, as follows: (1) the level of protection that may be required for potential ecological receptors would be determined through further testing at the time of remedial design/remedial action; (2) the areal extent of cover would be determined at the time when the aforementioned testing is performed; and (3) the cover, if required would include a layer of gravel in replacement for rip-rap.

3.1 COMMUNITY PREFERENCES

A public meeting was held on September 29, 1998 at Lexington Park, in the vicinity of NAS Patuxent River. The proposed remedial action plan for Site 17 was presented at this public meeting. No significant comments that required a revision to the PRAP or this ROD were received at the public meeting or during the public comment period that ended on October 29, 1998.

3.2 INTEGRATION OF COMMENTS

The following is a summary of the response to a comment that was received during the public meeting, which required further investigation:

One audience member asked Mr. Richard Ninesteel (of Tetra Tech NUS, Inc., the Navy's contractor) certain details of the present-worth cost estimation. The present-worth is the amount of money (in today's dollars) that would be used to pay for the capital cost of remedial action and the additional sum of money that would earn adequate interest for the operation/maintenance in the long term. The audience member requested to know the interest rate that was used in the calculation of present worth of the proposed alternative. The discount rate used was 7 percent per annum, which is in accordance with OSWER Directive No. 9355.3-20, June 25, 1993. Although interest rates cannot be predicted accurately over a long duration of time, the exact interest rate is not considered by the Navy to be critical at this time. In the PRAP the present-worth costs are mainly used for the purpose of comparison between alternatives. Since the present-worth costs are predominantly associated with initial expenditure (capital) rather than long-term operation/maintenance, a variation in the interest rate would not alter the relative cost comparison of these alternatives.

GLOSSARY

<u>Administrative Record</u>: A body of documents that form the basis for the selection of a CERCLA response action and which demonstrates the public's opportunity to participate and comment on the selection process.

<u>Applicable or Relevant and Appropriate Requirements (ARARs)</u>: Related federal and state environmental statutes, laws, or provisions. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or other limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

<u>Background Samples</u>: 1) Naturally occurring levels: ambient concentrations of chemicals present in the environment that have not been influenced by humans 2) Anthropogenic levels: concentrations of chemicals that are present in the environment due to man-made, non-site sources.

<u>Bench-Scale Tests</u>: Laboratory testing of potential cleanup technologies. Contaminated media from the site are generally used to determine if the treatment technology can be used to cleanup the site. See also Treatability Study.

<u>Carcinogenic</u>: Causing or inciting cancer.

<u>Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)</u>: A federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA). The act created a special tax that goes into a Trust Fund, commonly known as Superfund, to investigate and clean up abandoned or uncontrolled hazardous waste sites. The Department of Defense under the Defense Environmental Restoration Fund funds navy compliance with CERCLA/SARA (see IR Program).

GLOSSARY

<u>Incremental Cancer Risk (ICR)</u>: The potential for incremental cancerous human health effects due to exposure of contaminants of concern.

<u>Constituents of Concern (COCs):</u> Compounds or analytes identified as a possible source of risk based upon a comparison between compound concentrations and established screening levels (e.g., Federal Drinking Water Standards).

<u>Detection Limit</u>: The minimum concentration, which must be accurately and precisely measured by the laboratory and/or specified in the quality assurance plan.

<u>Downgradient</u>: Down hill or down slope.

<u>Ecological Receptors</u>: Non-human, native organisms that may be exposed to site contaminants.

<u>Ecological Risk Screening</u>: The qualitative evaluation to assess the risk posed to ecological receptors by the presence, potential presence, and/or use of specific COPC.

<u>Exposure Pathway</u>: A way that a person, plant, or animal may be exposed to a COPC. For example, water may be an exposure pathway for fish.

<u>Engineering Evaluation/Cost Analysis (EE/CA)</u>: A brief report that evaluates alternatives to cleanup contamination at a site.

<u>Feasibility Study (FS)</u>: Report that summarizes the development and analysis of remedial alternatives considered for the cleanup of CERCLA sites. Focused Feasibility Studies are for sites with conditions that allow a limited number of alternatives to be considered.

<u>Gas-Phase Destruction</u>: A treatment technology that uses a gas, such a nitrogen, and elevated temperatures to treat hazardous substances, pollutants, and/or contaminants.

<u>Groundwater</u>: Free water located beneath the ground surface in pores of materials such as sand, soil, gravel, and in cracks or solution features in bedrock. Often serves as a source of drinking water.

<u>Hazard Index (HI)</u>: A number indicative of noncarcinogenic health effects, which is the ratio of the existing level of exposure to an acceptable level of exposure. A value equal or less than one indicates that the human population is not likely to experience adverse effects.

<u>Hazard Quotient (HQ)</u>: The ratio of a single substance exposure level over a specified time period to a reference dose for that substance derived from a similar exposure period.

<u>Human Health Risk Assessment</u>: The qualitative and quantitative evaluation performed in an effort to define the risk posed to human health by the presence or potential presence and/or use of specific COPC.

<u>Installation Restoration (IR) Program</u>: A component of the Defense Environmental Restoration Program created under CERCLA regulations and funded by the Department of Defense. The purpose of the Program is to identify, assess, characterize, and clean up or control contamination from past hazardous waste disposal operations and hazardous material spills at military activities.

Leachate: Water that collects contaminants as it trickles through wastes, or other materials. Leaching may occur in farming areas, feedlots, landfills, and hazardous waste sites, and may result in hazardous substances entering surface water, groundwater, or soil.

Maximum Contaminant Levels (MCLs): The enforceable primary drinking water standards under the Safe Drinking Water Act (SDWA) with which public water systems must comply.

Media: Air, water, soil, or sediments, which are the subject of regulatory concern, investigation and cleanup.

Monitoring Well (MW): 1) A well used to obtain water quality samples or measure groundwater levels. 2) A well drilled at a hazardous waste management facility or Superfund site to collect groundwater samples for the purpose of physical, chemical, or biological analysis to determine the amounts, types, and distribution of contaminants in the groundwater beneath the site.

National Priorities List: EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial action under CERCLA.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP): The federal regulation that guides determination of the sites to be corrected under the CERCLA program and the program to prevent or control spills into surface water or other portions of the environment.

Parts per Billion (ppb): A way of expressing very small concentrations in air, water, soil, food, or other products. A part per billion is equal to about 1.5 oz of liquid placed into 12,000,000 gal of another liquid.

Parts per Million (ppm): A way of expressing small concentrations in air, water, soil, food, or other products. A part per million is equal to about 1.5 oz of liquid placed into 12,000 gal of another liquid.

Pesticides: Substances or mixtures of substances intended for preventing, destroying, repelling, or mitigating any pest, e.g., rats, weeds, or mosquitoes.

Pentachlorophenol (PCP): Dark-colored flakes and needle-like crystals, which have a pungent odor when, heated. PCP is used in wood preservatives, wood products, starches, dextrin, glue and pest control in herbicide formulation. PCP causes a variety of systemic (affecting the entire organism or bodily system) problems that can lead to death. PCP is a Group B2, probable human carcinogen.

Preliminary Assessment: The process of collecting and reviewing available information about a known or suspected waste site or release.

GLOSSARY

Record of Decision (ROD): A ROD is a public document, which explains the cleanup alternative to be used at a CERCLA site. The ROD is based on technical and financial analyses generated during the RI/FS and on consideration of the public comments and community concerns.

Remedial Investigation (RI): The RI is prepared to report the type, extent, and potential for transport of constituents of potential concern at a hazardous waste site, and directs the types of cleanup options that are developed in the FS.

Remedial Design (RD): The phase of the cleanup process where the specifics of the design of the selected remedy, which includes the preparation of technical drawings, plans, and specifications, needed to implement the cleanup.

Remedial Action (RA): The phase that involves the construction, operation, and implementation of the remedy to cleanup the site.

Removal: 1) An action to abate, minimize, stabilize, remove or eliminate the release or threat of release of a hazardous substance, pollutant or contaminant. 2) The cleanup or removal of released hazardous substances, pollutants and/or contaminants from the environment.

Risk Based Concentrations (RBCs): EPA Region III has developed this list of concentration levels for screening analytical data from CERCLA sites to identify COPC.

Sediment: 1) Material transported and deposited by water. 2) Soil, sand, and mineral washed from land into water, usually after rain.

Semivolatile Organic Compounds (SVOC): A group of organic compounds composed primarily of carbon and hydrogen that are characterized by their low volatility. SVOC include substances that are contained in hydrocarbon products like asphalt, oil, and tar.

Site Inspection (SI): The collection of information from a property to assess the extent and severity of hazards posed by the property.

Target Analyte List (TAL): A list of inorganic analytes including naturally occurring elements and cyanide which EPA has identified for use in assessing potential hazards at CERCLA sites.

Target Compound List (TCL): A list of organic compounds including VOC, SVOC, pesticides and PCB which EPA has identified for use in assessing potential hazards at CERCLA sites.

Thermal Desorption: A wide variety of treatments processes used to physically separate volatile and some semivolatile contaminants from soil, sediments, and sludge using elevated temperatures. The vapors are subsequently collected and treated.

To Be Considered (TBC): Non-promulgated advisories (such as reference doses or potency factors), criteria, and guidance issued by Federal and state governments not having the standards of ARARs.

Treatability Studies: A test of potential cleanup technologies conducted in a laboratory.

Toxicity Tests: Biological testing (usually conducted on earth worms or leaf lettuce) to evaluate the adverse effects of a contaminant.

Vadose (Unsaturated) Zone: The area of the earth that is located above the water table and capillary fringe, in which void spaces (pores) of soil or rock are partially filled with water.

Volatilization: Vaporization or evaporation.

Volatile Organic Compounds (VOC): A group of organic compounds composed primarily of carbon and hydrogen that are characterized by their tendency to readily evaporate (or volatize) into the air from water or soil. VOC include substances that are contained in common fuels, solvents, and cleaning fluids.

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APPENDIX A

LETTER OF CONCURANCE

MARYLAND DEPARTMENT OF THE ENVIRONMENT

2500 Broening Highway ! Baltimore Maryland 21224

(410) 631-3000 ! 1-800-633-6101 ! http://www.mde.state.md.us

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

November 16,1998

Mr. Bayly Smith
Patuxent River Naval Air Station
Environmental Department
Public Works Building 504
Patuxent River MD 20670

RE: Record of Decision for Operable Unit 1, Soils, Pesticide Shop (Site 17), Naval Air Station. Patuxent River Maryland

Dear Mr. Smith:

The Maryland Department of the Environment (MDE), Waste Management Administration has reviewed the above-referenced document. In accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act, this Record of Decision documents the remedial action selected by the Navy for Operable Unit 1, Soils, Site 17 Pesticide Shop.

The remedy selected by the Navy is a soil and gravel cover over the former pesticide shop area to mitigate exposure of human or ecological receptors to residual pesticide contamination in soil. Prior to the placement of the cover, the Navy intends to remove the former pesticide shop structures along with soil that exceeds human health based criteria. Based upon the acceptable level of protection to human health and the environment provided by the remedy, the MDE concurs with the selected remedy.

If you have any questions, please contact me at (410) 631-3394.

Sincerely,

John Fairbank for Kim Lemaster

Kim Lemaster
Section Head
Federal/NPL Superfund Division

cc: Ms. Donna Jordan, EFACHES
Mr. Andrew Sochanski, U.S. EPA
Mr. Richard Collins
Ms. Hilary Miller
Ms. Shari Wilson

APPENDIX B

PUBLIC MEETING TRANSCRIPT

COPY

SITE 17, PESTICIDE SHOP

PROPOSED REMEDIAL ACTION PLAN

PUBLIC HEARING

SEPTEMBER 29, 1998

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The public hearing was taken on Tuesday, September 29, 1998, commencing at 6: 30 p.m., at the Frank Knox Training Center, Patuxent River, Maryland before Mary Clare Ochsner-Hammond, Notary Public.

P R 0 C E E D I N G S

CAPTAIN ROBERTS: If I could have your attention, please. We’ll go ahead and get started. I’d like to welcome all of you to the public hearing, which is the opening of the 30-day phase of –- public comment phase that we go through in any remediations that we do.

I’m pleased that you’re here. We really do want public comment. We want to hear your comments on this and it’s important to us in setting these up and doing the advertising and so on. We really do want your comments and support this.

This public hearing concerns Site 17, which is the pesticide shop and our proposed remediation action to clean that particular site up. The person who is going to start the presentation is Donna Jordan. You’re going to start. Right?

MS: JORDAN: Okay. Captain, are you

ready?

CAPTAIN ROBERTS: Are you ready?

MS. JORDAN: Yes, sir.

CAPTAIN ROBERTS: Okay. We'll get into the briefing and she is going to be addressing a little bit on the process and why we hold the public hearings and a little bit on that process and where we are on the process on this particular site. You're going to have to speak up a little bit.

MS. JORDAN: It will be easier to see if the lights are dim in back. Joe, could you get that for us, please? No one's going to fall asleep. Right? Okay. You can see this better than you could when the lights are up.

Good afternoon, everyone. I'm Donna Jordan, the lead project manager for NAS Pax River. I'm going to talk to you about what the Navy is proposing as a remedial action for the soils, which is what we're calling Operable Unit One, at Site 17 also known as the pesticide shop for the base.

I’m going to present this in a sort of detailed explanation for those of you here who may not be that familiar with the process that we’re following. So, those of you who are familiar, I’m going to ask you to bear with me for the benefit of those who may be hearing this for the first time.

The proposed plan. This is where we enter the public participation phase of our remediation here on the base. And what the public participation document does, which is the proposed plan, is it outlines and tells about what it is we plan to do, to give the base a rationale for doing the action.

It discusses potential impacts to human health as well as the environment and by environment we’re talking about ecological receptors such as the bugs, the bunnies, the worms and the birds, those are ecological receptors.

We’ll also provide documentation for what we’re doing. We’ll tell you where you could find supporting documentation if you're interested in doing some further reading to sort of see how we got up to this point. And it also discusses the participation process as far as how we get to remedy selection.

Now I’m going to talk about the IR process. We started here with the site discovery, which was in the early 1980's. From identifying a site where we felt there might have been a potential for relief, we did what we call a preliminary assessment, look at the documentation, find out what types of materials were used there or stored there.

And from there we went on and conducted what we call a site inspection where we actually take some samples of the soil and groundwater, if applicable, and the sediments to find out what type of material we’re finding in the soil above certain screening levels for human health and the environment.

From there we move on into the remedial investigation phase where we actually work to find the limits of the materials that we found. We also refer to that as the contamination that we found at the site. And from the remedial investigation, we look at the nature and extent.

We then go on to the feasibility study to look at different alternatives to address the contamination that we found there. After we had conducted the feasibility study, the next step will be the proposed plan along with the Record of Decision.

So, the proposed plan will document to the public what we have done so far to date with doing our investigation and what we plan to do for the remedy. And the decision that we make as far as what we will actually do to clean the site will be documented in the Record of Decision and I'll explain a little bit more about that later on.

From there we will have what we call the remedial design where we actually put together some type of scope of work, a plan of action, to be implemented for the site. And then actually we go out and implement our decision, which is called the remedial action.

After we put it into action, then we’ll need to monitor the work that we have done to make sure we did achieve our goal of remedying the site. And once we have demonstrated to the regulators that we have met our goals, then we will next move into discussing site closeout.

Okay, this deals more with the -- going from IFS to Record of Decision. We have a list of alternatives that we look at in the feasibility study. So then, we need to identify what the preferred alternative is. And there’s some criteria for that and I’ll discuss that a little bit later.

From there we move into the proposed plan, as I mentioned earlier, and then the public has 30 days to comment on the proposed plan. We’ll make a decision on the remedy that we’re going to select and then we’ll document it in the Record of Decision.

Okay, the purpose of the Record of Decision. This is a legal document which certifies and states in writing what the remedy is that we're selecting and it's done in accordance with CERCLA. If you're not familiar with the term CERCLA, it's an acronym that stands for Comprehensive Environmental Response Compensation Liability Act which was passed in 1980 and the National Contingency Plan or the NCP are the regulations that implement the law, CERCLA.

It's a technical document. So, it discusses a lot of engineering comments and it also list our remediation goals and it also is the source of information for the public. So, if there is a question about why the Navy did choose this action, you can always go back to the Record of Decision to look at what's stated in there.

The Record of Decision is a comprehensive document. The declaration, which is on of the first items you get to when you open the Record of Decision, has declaration statements and it is signed by the EPA and the Department of Defense.

There's also a decision summary which talks briefly about what the site contained and why we selected this particular remedy for the site and it also discusses the remedy. And also, the Record of Decision contains a responsiveness summary where if we have any questions or comments that came form the public during the public comment period, we address them in the responsiveness summary which is attached to the document.

This is an overview of Pax River. I know this is kind of hard to read. It just sort of gives you an idea of what we're talking about here. And this is –- we're about here.

MR. TARR: Go up, keep going.

MS. JORDAN: Right out in here, okay.

MR. TARR: Go to about two o'clock. Back to the left, left, down. Right there.

MS. JORDAN: Okay. Site 17. It's hard to see, but we just kind of wanted to give you an overview of the whole base before we went on to show you the actual site. This is the pesticide shop, building 841, and then there's also another storage building, 110.

MR. TARR: 1110.

MS. JORDAN: 1110. Back here. And these buildings will also be demolished as part of the remedy of the site. Okay. The proposed plan contains various sections. One is the introduction, just sort of like some information about the base and about this document and what we hope to gain form you-all reviewing this document and commenting on it.

Then we'll talk about site background, our history of the site, then we'll have a section that talks about the different remedial or remediation alternatives that we looked into for addressing the contamination at the site. And then we'll evaluate the alternatives. And later on Rich Ninesteel is going to talk about the criterias used for making that evaluation.

Then they'll be a preferred alternative selected and then it also talks about how to get your comments addressed and where to send your comments or call if you have questions or need other information.

Okay. Site 17. The history is, this was the main facility or the facility for pest control operations here at Pax River and it was from the early sixties until the late eighties. And what had happened is because it was a pest control operation a lot of the equipment was rinsed, a lot of unused product was dumped out into the ground, and also there was a sink which had a drywell, just a pipe form the sink going into the ground, where some of the rinsate materials or the unused portions were rinsed form the sink and placed into the ground.

There were also – some of the vehicle trucks were rinsed, when they were finished making their rounds, into an ash pad. There was also a holding tank that was installed there. And the tank contained some of the materials that were placed there and any type of residual materials that came out, also disposed there at the site.

This is a picture of the site. It’s been fenced off. The fence was put up some years ago as part of the remedial action to keep people out so that they would not be exposed to the pesticides there at the pesticide shop and this is 841, which was the main building. That’s 1110 in the back. And this is a schematic of Site 17 and this is from the removal action that was done –- was it ‘94?

MR. TARR: Ninety-one.

MS. JORDAN: Ninety-one. Where we removed some of the contaminated material because when it rained, it was moving some of the material down to this ditch which drained off into a pond –- pond three across the street. Okay, the removal action was done in ‘91 and we cleaned up an area around the concrete pad and the asphalt driveway and the ditches as I mentioned earlier.

We conducted or completed some confirmatory samples that were collected and that was just to make sure that we had actually removed the contamination that we wanted to remove. So, we did collect the confirmatory samples to make sure that the levels that were remaining there were safe for human health.

Okay. At this point I’m going to turn it over to Rich Ninesteel from Tetra Tech. He’s going to talk about the focused feasibility study which was conducted by Tetra Tech and at the end I’ll come up and talk about the schedule of upcoming events. Rich?

MR. NINESTEEL: Thank you. Again, my name is Rich Ninesteel. I work for Tetra Tech. We were hired by the Navy to perform the feasibility study and prepare the proposed plan that you-all got copies of tonight. We’ll also be working very shortly on submitting the draft broad as part of the process here.

Just a little overview of the focused feasibility study. The overall goal of the feasibility study is to develop a range of alternatives for the decision makers to look at, everything from no action to containment alternatives, where the waste material is left on-site, to alternatives that involve treatment both on- and off-site.

We looked at six alternatives of which

there were several suboptions. Just to go through the alternatives. By law, we have to evaluate the no action alternative. It's really a baseline against which all the other alternatives are measured.

Alternative No. 2 was an in-place capping alternative where all the contaminated soil was left on-site and we looked at placing a cap over all of the contaminated soils. This is a drawing we put together of what the conceptual cross section of what the cap would look like.

It involved a synthetic liner at the bottom with a drainage layer on top for positive drainage of any rainfall. And then there was also a compacted soil layer and a vegetative layer on top. And again, this would just contain the contaminated soils in place.

We also looked at an in-situ treatment alternative. It involved, fixation and stabilization. This technology would involve mixing a cement slurry with the soil, basically to form an impermeable mass which -- on top of which we would place a soil cap.

And this is just a schematic of how the plan would be implemented. We would mobilize equipment to the field, treat the material at the soil's in-place, place a compacted soil layer above the treated soils and following that there would be institutional controls put in place to prevent any disturbance of the cap and there'd be long-term monitoring.

The fourth alternative had two suboptions. The overall alternative looked at excavation of all the soils that were above all the standards that we were comparing to. And the first alternative looked at treatment off-site using incineration, which essentially gets virtually complete destruction of the DDT in the soil.

And the second option looked at landfilling of the soils off-site. This was -- this also involved some regulatory –- jumping through some regulatory hoops. The soils that we have out there, once you pick them up, they're

RCRA waste and they’re subject to the requirements of RCRA. In which case, soils contaminated with the levels of DDT, which is our main contaminant –- our main pesticide –- we would require treatment.

So in this case, we would have –- we would have had to request a waiver of the treatment standards that would allow us to place the material in the landfill without treatment. This is really just again a schematic. Mobilization followed by excavation of the soils that exceeded the ecological PRGs.

Maybe a quick step backwards. We have soils here that range from the low part per million level of DDT, which is the main site contaminant, all the way into the hundreds of parts per million. We in a risk assessment -- risk approach to establishing cleanup levels. There are human health standards or PRGs, which is preliminary remediation goals.

For the contaminant, the main contaminant which is DDT, and its breakdown products we’re looking at a number of approximately 18 parts per million as a cleanup level to be protective of human health, but from an ecological standpoint we’re looking at environmental receptors. We have an actually lower cleanup level of approximately two parts per million.

That’s because the receptors –- the ecological receptors, the animals, are in direct contact with the soil and also DDT is a compound that can accumulate and so we have a lower level here. This alternative was cleaning up all the way down to the ecological PRG of about two. And, again, we had the two options of off-site treatment.

The fifth alternative we looked at in the feasibility study involved excavation of all the soils and on-site thermal desorption with backfilling of the treated soil on-site. And, again, this is a simple block-flow diagram of what would have happened. Excavation, treatment and placing back on-site and then vegetating the material.

The sixth alternative has four suboptions and this is where we looked at different options for the hotspot soils, which we defined as those above the 18 part per million level, which is the PRG for human health. And another alternative for the lesser contaminated soils those between two parts per million and 18 parts per million, which would be all remaining soils which exceeded the ecological PRG.

So, we looked at these options. And all involved excavating the soils that exceeded-- that were the hotspot soils, that’s about a thousand cubic yards. And then leaving the remainder on-site which would be another 3,000 cubic yards.

The first suboption, 6A, involved excavating the hotspot soils and taking them off-site and landfilling in a RCRA landfill. Again, this would require the waiver of the treatment standards that were required for this type of soil. And then the remaining soils that were left on-site would be regarded and capped with clean soil.

6B, again, excavation of the hotspots, but in this case off-site incineration at a permitted RCRA incinerator and, again, capping the residual soils with a soil cover. Alternative 6C. Excavation of the hotspots and then on-site thermal desorption and then backfilling of the treated soils, regrading and clean soil cover.

And then alternative 6D. Again, on-site thermal treatment –- thermal disposal of the this case, off-site landfill disposal of the treated soils and then the remaining soils capped with a soil cap. This is, again, just a flowchart of what I talked about. Excavation, one type of treatment –- one out of four types of treatment-- and then capping the remaining soils.

This is just a map of the soils that are on-site to get an idea of the percentages of soils that exceed the ecological PRGs and then also those that exceed the human health. The darker areas that have the double cross-hatching are the soils that exceed the human health standard, about

18 PPM. That’s approximately one-fourth of the material that’s out there.

The remaining, the lighter hatching on the map, are all the other soils. And again, that would be the extent of –- the maximum extent of effected soils on the site. This is just an overview of the range of costs that we have.

If we exclude No. 1, which was no action, we have cost that range from less than $1 million –- approximately $770,000 on a present worth, which was alternative 6A, all the way up to over $4 million. Just a quick explanation of present-worth cost.

As you can see, for any option, we have a capital cost. That is the cost of implementing the clean up in –- at time zero. In many of these alternatives where there is some level of contamination left on-site, there is long-term operation and maintenance which we refer to as O&M cost. And what the present-worth calculation does is, it gives you a standard where you can compare apples to apples for all cost options.

What it looks at is taking a present-day worth of what you have to pay for the capital, plus put in the bank to pay for the long-term O&M cost. And that way we can compare the cost of alternatives that have different capital and O&M cost on a constant basis.

Under CERCLA, it defines three types of evaluation criteria, grouped into these three categories. There are a total of nine criteria that were in the feasibility study for each alternative that we had to evaluate.

There’s the threshold criteria, which are statutory requirements that a chosen alternative must satisfy. There are five balancing criteria that used to weigh the pros and cons of the different alternatives. And then there are two modifying criteria that are looked at at the end of the process during the public comment period.

The threshold criteria. Number 1, overall protection of human health and the environment. And the environment is defined as the ecological receptors that might be present at the site. Again, this describes how –- when we evaluate this, we describe how the alternative will achieve and maintain protection of human health and the ecological receptors on-site.

Also, we have to comply with applicable or relevant and appropriate requirements and these are –- the acronym for that is ARARs, all that basically we have to comply with ARARs. We -- apply, and if not, we would have to look at getting a waiver.

The balancing criteria. Here's where we look at one alternative versus another. One of them is long-term effectiveness and permanence. Obviously, the more permanent a solution –- for example, incineration, you get greater than 99.99 percent destruction of the contaminant of concern. That is a very permanent solution. Whereas, capping is a less permanent solution. You are not destroying the material, you're leaving it on-site. Reduction of toxicity, mobility, and volume.

CERCLA has a strong preference for the

reduction of toxicity, mobility, and volume. Again, that’s just a way of making sure that the potential hazards related to the site are reduced by the alternative you’re looking at. Short-term effectiveness, again, looks at really during the construction phase just to make sure that whatever is being implemented is protective of the workers and the local population and environment.

Some of the balancing criteria to continue implementability, of course, we have to choose an alternative that can be implemented. It’s a matter of –- that’s what the construction people look at it and make sure that whatever we’re looking at on paper can actually be implemented in the field.

And then cost. Cost is an important factor. Certainly when we’re spending government money, we look for a cost-effective solution that will achieve the goals at the lowest possible price. And then the modifying criteria. We look for State acceptance of the alternative that we’re choosing and then community acceptance, which is the reason we’re here tonight, to present the alternatives to the public.

Based on comments we receive, it is possible that if necessary –- DOD, the Navy, and EPA will look into your input –- will look at your input on the chosen alternative and, if necessary, go back and reevaluate the alternatives.

The chosen alternative –- the preferred alternative, I should say, is alternative 6B. And we’re presenting that tonight as the Navy’s preference and the EPA’s preference and to solicit your input on this choice. Again, this is the excavation of the hotspot soils, approximately a thousand cubic yards, and off-site incineration, which is complete –- virtually complete -- destruction of the DDT in those soils and then regrading the material that’s left, the soils that are contaminated between 2 PPM and 18 PPM and covering with a two foot soil cover.

We feel that it is the most cost-efficient approach. We will have a graph in a minute here that will show under this alternative we are destroying over 80 percent of the pesticide mass that's in the soil, but only affecting about approximately 26 percent of the contaminated soil. we think it's a good optimum.

Once you start getting into the lower contamination -- lower contaminated soils, the soil volume increases dramatically and the costs go up dramatically, also. Why don't you go to the next slide? This is just a quick review. It might be tough to review the numbers here, but this is a presentation of the PRGs, the preliminary remediation goals, the cleanup levels that we are working toward on this site.

When you add up -- as I mentioned before, there are DDT and its metabolites-- when you add up the concentrations for the ecological receptors, we're talking again approximately 2 PPMs. For human health -- protecting human health it's approximately 18.

There are other compounds that are of concern on this site, but our data shows that by far the controlling parameter that is out there is

DDT. That's the most widespread, the most frequently detected. And our evaluation of the data also shows that by cleaning up the DDT we are also cleaning up the hotspots of the other pesticides that are on-site.

This is the curve I was referring to. Basically we -- this is the point that represents the human health cleanup criteria. Again, there's approximately a thousand cubic yards of soil material which represents about -- a little bit over 80 percent of the mass of DDT at the site.

What this curve shows is that as you try to get lower and lower values -- clean up to lower and lower values, the amount of soil that you're dealing with increases dramatically, such that back on the costing table you could see where the cost from going from just the partial incineration here of the hotspots to the treating all soil types-by incineration, for instance, would go from a little less than $2 million to almost $5 million. So, here we're getting the most bang for our buck and we are still protective of human health and the environment in the overall alternative.

This is a bar chart showing the costs of all the different alternatives. This is the preferred alternative right here -- excuse me, right here. So, we're kind of in the midrange of costs. We've not selected the lowest nor the highest, but again, it is relative to the cost effectiveness of the preferred alternative.

Just as a review of how we meet the statutory requirements. We are protective of human health and the environment. Human health by removing all soils that exceed the human health of protectiveness of PRGs, taking them off-site and incinerating. And the environment by capping over the residual contaminants -- contaminated soils that are left on-site essentially preventing -- giving a barrier between the contamination and so that potential ecological- receptors cannot reach those soils. We comply with all the statutes that are the applicable requirements.

Again, I discussed the cost-effectiveness. We -- there is a strong bias within CERCLA to use treatment as a principal element. Here we are looking at destruction by incineration of the hotspot soils which also gives a permanent solution that is a completely irreversible process.

And again, as I said, the levels that we are removing are protective of human health and also groundwater. All the soils that can eventually impact groundwater by leaching long term will be removed and incinerated and, as I said before, the residual soils will be capped in place.

The treatment off-site at the RCRA permitted incinerator will meet the land disposal requirements. So, no waiver is required and the residuals will be treated to extremely low levels at the facility. And the soils that are left on-site, again, will be protective of human health and the environment.

Again looking at the fact that we utilize a permanent solution, we're treating the proportion of the soils that pose the principal threat, the highest contamination hotspots, and we believe this alternative offers the best balance and trade offs from long-term effectiveness and permanence by treating the hotspot soils by incineration. Again, we're reducing toxicity through treatment of these hotspot soils.

The short-term effectiveness. We're looking at a very short construction time frame dealing with excavation and hauling off-site and it's easily implemented. This is a standard technology used on numerous sites in the past and we believe it is a cost-effective solution.

The preference for treatment is a principal element that is embedded in the CERCLA requirements. Again, we are treating the hotspots and we're addressing the principal threat to life by incinerating those soils. This is just kind of a nice drawing of the way-things will go.

We're going to excavate, transport off-site, treat, the residuals will end up in a landfill connected with the treatment facility.

Very simple process. That really concludes the technical portion of the presentation. I think Donna would like to talk about the overall schedule for implementation.

MS. JORDAN: Yes, Rich. Okay. As you can see by the schedule, we plan to move pretty quickly on this. So, at the end of the comment period, which will be a month from now, we plan on having the Record of Decision ready by the 13th of November. This is a very aggressive schedule.

This is what we would like to see happen. So, don't hold us to that date, but we do want to work very quickly to get this implemented. Right now we are anticipating OHM, who's the remedial action contractor or our RAC as we like to call them, OHM was the contractor that did the landfill, Site 11, that you may be familiar with. They will be coming back and plan to mobilize around the middle of November.

We plan to have everything all taken care of, all the confirmatory sampling results and saying we've met our goal, by the first week of

January of ’99. Available information can be found at the Lexington Park Public Library. There's the address and telephone number. Also, you can call the Naval Air Station at this address and phone number.

MR. TARR: That's the public library and the library on station.

MS. JORDAN: Okay. And that's the library on base. That's the Commanding Officer's address. If you want to send comments, please forward it to this address. Okay, on the back table there are handouts that give descriptions on the types of contaminants that we have at Site 17. There is also a copy of the presentation in the back and I think that's it. Are there any questions?

AUDIENCE MEMBER: What type of cap are we talking about? And what's the material and how deep is it?

MS. JORDAN: We're mainly.talking about soil. We're planning to put down a barrier, a marker, it's not really like a geotextile but more of just a marker to show where we brought in the clean soil. And that will help us with our maintenance to check it to make sure that the cap hasn't been disturbed and we'll be monitoring and maintaining that cap and we'll be laying some type of soil and vegetating over that.

AUDIENCE MEMBER: Approximately how thick?

MS. JORDAN: About two feet. That is what the EPA biological technical team has deemed to be acceptable to eliminate the pathway for the ecological receptors, two feet down.

AUDIENCE MEMBER: Is money available for this now?

MS. JORDAN: Yes, it is. Yes, it is.

AUDIENCE MEMBER: How high is the water table there? Does the groundwater contamination and groundwater treatment need to be considered?

MS. JORDAN: Okay. The water table is actually pretty shallow. It is between five and eight feet down below the surface and currently what we're finding is that it is actually discharging into the pond. We have detected some very low levels of pesticides in the groundwater.

The groundwater is going to be handled later on and we're looking at that as part of the remedial investigation for the groundwater on Site 17. So, we're still working on that to find out whether or not we need to do anything to that.

AUDIENCE MEMBER: Is there going to be any checking to see if there any fluctuation in the groundwater after the first of the year?

MS. JORDAN: Yes. Another question?

AUDIENCE MEMBER: What interest rate assumptions are you making when you calculate the present worth?

MR. NINESTEEL: They're pretty conservative. Probably 6 percent -- well, probably about 3 percent inflation, 6 percent return and I'd have to check the numbers exactly.

AUDIENCE MEMBER:- And 6 percent interest possibly?

MR. NINESTEEL: I would have to check in the feasibility, but it's pretty standard numbers that are used.

AUDIENCE MEMBER: That's throughout the life of the --

MR. NINESTEEL: The numbers really run for 30 years because beyond that the cost of -- the O&M cost beyond 30 years really doesn't have any substantial impact on the present work goals.

AUDIENCE MEMBER: Would you feel comfortable making a 30-year projection of interest rates?

MR. NINESTEEL: You have to use something. And, again, the reason is to get common comparison on the alternatives.

AUDIENCE MEMBER: I'm talking about if the assumptions are not realistic, then the conclusions also might not be realistic.

MR. NINESTEEL: But I think in this case if you look at -- the O&M costs are rather level compared to the capital costs and so I think if you looked at varying assumptions that went into the conclusions, it would still be the same even if you vary the interest rate.

AUDIENCE MEMBER: Okay.

MR. NINESTEEL: Because the numbers are so low right now.

MS. JORDAN: Any other questions? I invite you to get copies of everything that's on the back table. Please review it. If you have any questions or comments, please submit them to us. We're very interested in hearing what you have to say about this. We really would like to hear from you. Okay, Captain?

CAPTAIN ROBERTS: If you have any other questions, we are certainly willing to hang around and talk about them, any issues you might want to bring up, if you want to get our comments. Also, if anyone's interested in touring the facility, Mr. Bailey here is the point of contact and you can take a look at where the site is. He's good at this. Okay?

Any other questions or comments? I appreciate you coming out and being interested in our project. I think it's one of the examples of our approach to doing these projects. We try to use common sense. We want to do what is right, look at an alternative that meets the requirements, addresses the issues, and do what is right, for example, the incineration. And also do it -- do what is reasonable.

And I think this is an example of the way we look at these and look at those processes. So, I think this is a good example of doing that. All right. Well, I was certainly happy to have you here. We'll hang around to talk to you as long as you like.

AUDIENCE MEMBER: If I could make one comment, I'm certainly not the person to tell the Navy what to do, but before you were here on your tour, incineration is a really ugly word in St. Mary's County. And I certainly would strongly urge you to do a public service announcement or whatever you do to handle that so that the public understands clearly that incineration will be done off-site and what's going on with that because there's a real potential for misrepresentation.

CAPTAIN ROBERTS: Wisconsin, correct?

MR. NINESTEEL: Michigan.

CAPTAIN ROBERTS: Transported to Michigan.

MR. NINESTEEL: That was certainly one of the main criteria that went into the overall evaluation of this.

AUDIENCE MEMBER: And you have good people, I'm sure, that told you that. I just wanted to state the obvious.

CAPTAIN ROBERTS: And we looked at some of the alternatives that they had in on-site incineration. We're very aware of how ugly that happens to be and the emotions that surround that right now. We're very aware of that. In fact, it was part of the consideration when we looked at all the alternatives.

On-site incineration, low temperature, also carries a lot of risks with it with the -- of the land, of construction-rehab when you get down to the levels that you have. So you could, in fact, swing that cost, money, and then still not achieve your goals. There's an additional risk coming in there, also. So, it's a good point that we need to continue to emphasize that it is in fact in Michigan.

MR. BAILEY: Captain?

CAPTAIN ROBERTS: Yes?

MR. BAILEY: I would just like to say that this is the proposed plan. If you have any additional comments that you can think of and you don't think of them right now, there is a sheet on the back and just tear it off and you can mail it right back to us at the return address.

And the presentation that was up there was done in detail so you could take this presentation home with you, stick it in the proposed plan and then you'd have a lot of look at that you might want to think about during the 30-day comment period. And then, you can call Theresa and you can call her and she can answer any questions you have.

Please take this thing home with,you and any other members that didn't show up like George maybe can help us with that or Madeline, but it can go like it says right to that address.

MR. TARR: No, no. That's the libraries, additional information can be found at the libraries.

MR. BAILEY: Take the proposed plan home, look at the time lecture sheets and whatever you want to call this thing and put them together. If you have anything additional then send it in on this sheet.

I would like to introduce one more person here who's joined us is Jenny over here. She's the engineer in charge of the project when it goes to construction phase. She works at the base ROICC office and we're glad to have her on our team. She works in the public works facility. So, we're glad to have her on our side. She will be wearing her boots for sure.

CAPTAIN ROBERTS: Okay. Good thank you.

MR. BAILEY: We do have a state representative here, which is Kim Lemaster who's right there. And it's funny how the regulators sit together. Everybody, the legal officer is here, the public works officer is here, the CO is here, some of the engineers are here, the regulators, the public is here, my boss is here, new boss right there.

So, this is a very good group here and there are contractors that did a lot good work on this. So, if you do have anything else, let us know because we do want to clean this thing up and when you drive by this you're going to see green grass pretty soon. That thing will be gone. So, you have 30 days to let us know what you think.

CAPTAIN ROBERTS: Okay. Thank you

(Whereupon, the public hearing was concluded.)

CERTIFICATE OF REPORTER

I, Mary Clare Ochsner -Hammond, do hereby certify that the foregoing proceedings were stenographically recorded by me and reduced to typewriting under my supervision; that I am neither counsel for, related to, nor employed by any of the parties to the action in which these proceedings were transcribed; that I am not a relative or employee of any attorney or counsel employed by the parties hereto, nor financially or otherwise interested in the outcome in the action.

Mary Clare Ochsner-Hammond

MARY CLARE OCHSNER-HAMMOND

APPENDIX C

TABLE OF ARARs

CHEMICAL-SPECIFIC ARARs & TBCs

ARAR or TBC (Citation)	Status	Synopsis of Requirement	Action to be taken to Attain
Safe Drinking-water Act MCLs (40 CFR Part 141)	Relevant and Appropriate	Enforceable standards for contaminants in public water supply systems	Soil PRGs take into account protection of groundwater from further impacts
Reference Doses (RfDs) and Cancer Slope Factors (CSFs) (IRIS)	TBC	Basis for evaluating carcinogenic and non-carcinogenic risk to human health	Soil PRGs for human health protection were estimated based on RfDs and CSFs
Soil Screening Guidance (EPA's Technical Background Document, May 1996)	TBC	Soil Screening Levels (SSLs) are provided for protection of human health from various pathways of exposure including migration of contaminants to groundwater	SSLS were used as a preliminary screening tool for selecting COCs for evaluating impacts to groundwater. PRGs were developed for these COCs using site-specific modelling.
Cleanup Levels for Lead (Interim Guidance on Established Soil Lead Cleanup Levels at Superfund Sites, EPA 1989)	TBC	Soil cleanup levels for lead in industrial soils are in the range: 500 to 1,000 mg/kg. Groundwater cleanup level is 15 µg/L.	Used for assessing exposure to potential human receptors and impacts to groundwater.
EPA's Health Advisories	TBC	Limits on levels of certain intermittently encountered contaminants in public water supply	Used for assessing impacts to groundwater for certain contaminants that do not have MCLs
EPA's Ambient Water Quality Criteria (pursuant to Section 304 (a) (1) of the Clean water Act	Relevant and Appropriate	Legally non-enforceable standards for surface water quality, commonly adopted as enforceable standards	Used for assessing impacts to surface water and sediments in Pond 3.
Maryland Drinking Water Regulations (COMAR 26.04.01)	Relevant and Appropriate	Established MCLs for drinking water	State MCLs are identical to federal MCLs. Used to assess impacts to groundwater.

LOCATION-SPECIFIC ARARs & TBCs

ARAR or TBC (Citation)	Status	Synopsis of Requirement	Action to be taken to Attain
Coastal Management Act	Relevant and Appropriate	Federal activities or projects located in or directly affecting the coastal zone must be consistent to the extent practicable with Maryland's Coastal Management Program	Remedial action under the selected remedy is not expected to adversely impact the coastal zone. However, the remedial action work plan may require approval from the MDE, which is responsible for implementing the coastal program.
Chesapeake Bay Critical Area Protection Law	Relevant and Appropriate	New development in the critical areas (1000 feet landward of the tidal waters of the bay and its tributaries) must minimize impacts to the water quality and conserve plant, fish and wildlife.	Impacts due to the remedial action at the site on Pond 3 (which may ultimately discharge to the bay) are expected to be minimal and will be adequately controlled.

ACTION-SPECIFIC ARARs & TBCs

ARAR or TBC (Citation)	Status	Synopsis of Requirement	Action to be taken to Attain
RCRA Subtitle C Hazardous Waste Requirements • Identification and Listing (40 CFR 261) • Generator Requirements (40 CFR 262) • Transportation Requirements (40 CFR 263) • Standards for Owners and Operators of TSDF (40 CFR 264) and Interim Status (40 CFR 265) • Land Disposal Restrictions (40 CFR 268)	Applicable	Regulations that govern generation, treatment /storage/transportation and ultimate disposal of hazardous wastes	Soil at the site would be hazardous waste because it contains listed pesticides. Therefore, all remedial activities from excavation, stockpiling, transportation and incineration must be conducted in accordance with RCRA regulations. The selected incinerator and the landfill selected for disposal of the ashes will be RCRA-certified.
Maryland Hazardous Waste Regulations (COMAR 26.13)	Applicable	State's authorized RCRA program govern all the CFR requirements, expected LDRs	All of the remedial activities will be conducted in compliance with these requirements. The selected incinerator is likely to be located outside of the State of Maryland, and consequently the destination state's hazardous waste regulations will be complied with.
Maryland Stormwater Management Regulations (COMAR 26.17)	Applicable	Criteria and procedures for stormwater management	Land-disturbance (excavation) and construction (landclearing and grading) activities will involve areas exceeding the 5,000 square feet. Erosion and sedimentation controls and other aspects of the regulation will be followed.
Maryland Air Pollution Control Regulations (COMAR 26.11)	Applicable	Regulations governing air quality and air emissions	Particulate dust emissions during excavation, land clearing, grading, loading of soil on trucks will be controlled using dust suppressants and engineering methods of mitigation

Executive Order (60 FR, 154), 8/10/95 (Office of the Federal Environmental Executive: Guidance for Presidential Memorandum on Environmentally Beneficial Landscape Practices on Federally Landscape Grounds)	TBC	Guidance for Presidential memorandum on environmentally and economically beneficial landscape practices on federal landscape grounds	Native species of vegetation will be used on the soil cover

CHEMICAL-SPECIFIC ARARs & TBCs

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Safe Drinking-water Act MCLs (40 CFR Part 141)	Relevant and Appropriate	Enforceable standards for contaminants in public water supply systems	Soil PRGs take into account protection of groundwater from further impacts
Reference Doses (RfDs) and Cancer Slope Factors (CSFs) (IRIS)	TBC	Basis for evaluating carcinogenic and non-carcinogenic risk to human health	Soil PRGs for human health protection were estimated based on RfDs and CSFs
Soil Screening Guidance (EPA's Technical Background Document, May 1996)	TBC	Soil Screening Levels (SSLs) are provided for protection of human health from various pathways of exposure including migration of contaminants to groundwater	SSLS were used as a preliminary screening tool for selecting COCs for evaluating impacts to groundwater. PRGs were developed for these COCs using site-specific modelling.
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Chesapeake Bay Critical Area Protection Law	Relevant and Appropriate	New development in the critical areas (1000 feet landward of the tidal waters of the bay and its tributaries) must minimize impacts to the water quality and conserve plant, fish and wildlife.	Impacts due to the remedial action at the site on Pond 3 (which may ultimately discharge to the bay) are expected to be minimal and will be adequately controlled.

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Maryland Hazardous Waste Regulations (COMAR 26.13)	Applicable	State's authorized RCRA program govern all the CFR requirements, expected LDRs	All of the remedial activities will be conducted in compliance with these requirements. The selected incinerator is likely to be located outside of the State of Maryland, and consequently the destination state's hazardous waste regulations will be complied with.
Maryland Stormwater Management Regulations (COMAR 26.17)	Applicable	Criteria and procedures for stormwater management	Land-disturbance (excavation) and construction (landclearing and grading) activities will involve areas exceeding the 5,000 square feet. Erosion and sedimentation controls and other aspects of the regulation will be followed.
Maryland Air Pollution Control Regulations (COMAR 26.11)	Applicable	Regulations governing air quality and air emissions	Particulate dust emissions during excavation, land clearing, grading, loading of soil on trucks will be controlled using dust suppressants and engineering methods of mitigation

Executive Order (60 FR, 154), 8/10/95 (Office of the Federal Environmental Executive: Guidance for Presidential Memorandum on Environmentally Beneficial Landscape Practices on Federally Landscape Grounds)	TBC	Guidance for Presidential memorandum on environmentally and economically beneficial landscape practices on federal landscape grounds	Native species of vegetation will be used on the soil cover